SONY

V03291

PRO-BETACAM SP CAMCORDER

UVW-100P

ELECTRONIC VIEWFINDER

DXF-501CE

ZOOM LENS

VCL-713BX

TRIPOD ATTACHMENT

VCT-U14

SERVICE MANUAL

Vol. 1 (1st Edition)

BETACAM SP™

LITHIUM BATTERY
Replace the battery with a Sony CR2025 lithium battery. Use of another battery may present a risk of fire or explosion.

WARNING
Battery may explode if mistreated.
Do not recharge, disassemble or dispose of in fire.

Note
Keep the lithium battery out of the reach of children. Should the battery be swallowed, consult a doctor immediately.

ADVARSEL!
Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til laverandøren.

ADVARSEL
Lithiumbatteri - Eksplosjonsfare.
Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten.
Brukt batteri returneres apparatleverandøren.

VARNING
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en likvärdig typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt gällande föreskrifter.

VAROITUS
Paristo voi räjähtää jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

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Introducing this manual

This manual is the Service Manual Vol. 1 of the PRO-BETACAM SP camcorder UVW-100/100P.
This manual contains the maintenance information of this equipment, and the information on services such as the replacement of the parts and the adjustments.

Contains

The sections covered in the manual are summarized below to give you a general understaning of the manual.

Section 1 OPERATING INSTRUCTION
Describes the contents of the operation manual related to the operations of this equipment.

Section 2 SERVICE OVERVIEW
Describes how to replace of the parts, the locations of the parts, switch setting, and error cord on services.

Section 3 PERIODIC MAINTENANCE AND INSPECTION
Describes the periodic check and cleaning procedure.

Section 4 REPLACEMENT OF MECHANICAL PARTS
Describes how to replace the parts and how to adjust them after replacement.

Section 5 LINK SYSTEM ALIGNMENT
Describes the adjustment procedures of link system.

Section 6 TAPE PATH ALIGNMENT
Describes the adjustment procedures of tape path system.

Section 7 ELECTRICAL ALIGNMENT OVERVIEW
Describes the general information for electrical adjustments.

Section 8 CAMERA ALIGNMENT
Describes the electrical adjustments of power supply, CCD drive, synchronous signal, encoder, video process, and interface systems.

Section 9 VTR ALIGNMENT
Describes the electrical adjustments of power supply, system control, servo, audio, and video systems.

Related manuals

In addition to this Service Manual Vol. 1, the following manuals are provided.

- **Operation Manual (Supplied with equipment)**

Part No. 3-758-227-21
Describes how to operate this equipment.

- **Service Manual Vol. 2 (Not supplied with equipment)**

Part No. 9-977-585-21 (for UVW-100)
9-977-588-21 (for UVW-100P)
Contains block diagrams, board layouts, schematic diagrams, semiconductor pin assingments and parts lists.

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SECTION 1
OPERATING INSTRUCTION

This section is extracted from operation manual.

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How to Use This Manual

Purpose and audience

This operation manual covers the UVW-100K/100PK/100L/100PL Pro-Betacam SP camcorder. It describes the location and function of the parts of the system, preparations, adjustments and settings, and the basic procedures for recording and playback, covering all aspects of operating the unit.
This manual is addressed to camera users from enthusiast amateurs to experienced professional camera operators.

Organization of this manual

This manual contains the following sections.

Chapter 1 Overview
This chapter describes some of the functions and features of the system, and should be read before operating the unit.

Chapter 2 Location and Function of Parts
This chapter describes the location and function of the parts of the UVW-100K/100PK/100L/100PL which it is necessary to understand before operating the unit.

Chapter 3 Setting Up the Unit
This chapter describes the preparations for using the unit, including the fitting of accessories and connections required for shooting.

Chapter 4 Basic Recording and Playback
This chapter describes basic procedures for recording and playback. It then describes indications which appear in the viewfinder and display window.

Chapter 5 Adjustments
This chapter describes various adjustments and settings which are necessary for high quality recording. It also describes how to replace the lithium backup battery.

Chapter 6 Advanced Recording and Playback Operations
This chapter describes how to record time values to aid indexing for the editing stage, how to synchronize a number of camcorders, simultaneous recording on an external VTR, and how to carry out color playback.

Chapter 7 Maintenance
This chapter describes the warning system, troubleshooting, and care of the unit.

Appendix
Specifications

Chapter 1
Overview

This chapter describes some of the functions and features of the system, and should be read before operating the unit.

System Configuration **1-2**
Features **1-2**
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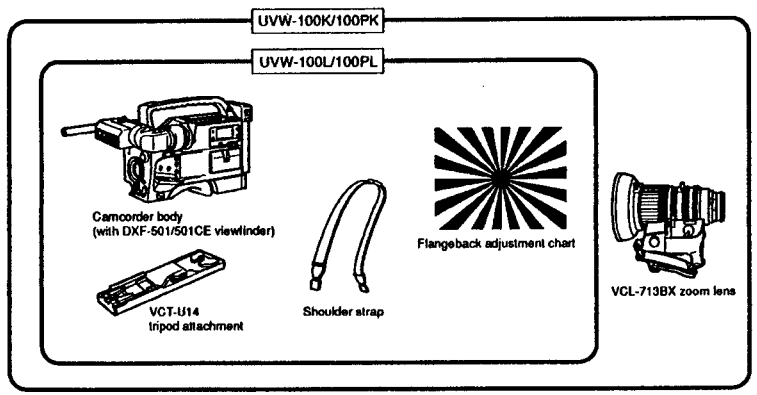
System Configuration

The UVW-100K/100PK and UVW-100L/100PL Pro-Betacam SP camcorders comprise the units shown in the following figure.



UVW-100K/100PK and UVW-100L/100PL system configuration

The LC-421 carrying case is also available as an additional option.

Features

The UVW-100K/100PK/100L/100PL comprises a three-chip color video camera employing an interline transfer Hyper HAD™ 1) sensor CCD 2) imager with 380,000 (UVW-100K/100L) or 440,000 (UVW-100PK/100PL) effective picture elements, integrated with a Betacam SP (Superior Performance) series videocassette recorder. This unit is compact and lightweight with no loss of quality over conventional separate camera systems or camcorders. Additional functions enable this unit to be used in an even wider range of locations.
The following are some of the principal features of the unit.

1) **Hyper HAD:** Hyper Hole-Accumulated Diode
"Hyper HAD" is a registered trademark of Sony Corporation.

2) **CCD:** charge-coupled device

Camera Features

High image quality Hyper HAD sensor CCD

The use of an interline transfer Hyper HAD sensor CCD imager provides high image quality.
- High horizontal resolution (700 lines or more).
- High signal-to-noise ratio (60 dB: UVW-100K/100L, 58 dB: UVW-100PK/100PL) provides a low-noise picture even with increased video gain.

Superior optical characteristics

The camera provides faithful color reproduction, with high sensitivity (f/8.0 at 2000 lx).

Electronic shutter

- Allows you to shoot fast-moving subjects with little blurring.
- Eliminates flicker when shooting under fluorescent lighting.

Clear Scan ™[1] function

The Clear Scan function reduces the banding pattern that appears when you shoot a CRT screen such as a computer monitor.

Automatic white balance and black balance adjustment and memory function

- The black set[2], black balance[3] and white balance[4] can be adjusted automatically. The settings are saved in memory and maintained when the unit is powered off.
- The auto tracing white balance (ATW) function automatically sets the white balance to the optimum value for the lighting conditions.

Backlighting correction

The intelligent auto-iris function automatically adjusts the exposure, allowing shooting with the appropriate exposure even with backlit subjects.

1) "Clear Scan" is a trademark of Sony Corporation.
2) **Black set:** A reference level for black balance adjustment.
3) **Black balance:** To balance the black level of the R, G, and B signals so that black has no color.
4) **White balance:** Adjustment of R, G and B signal levels, so that white objects are reproduced correctly as true white.

High-performance viewfinder

The viewfinder screen also provides the following adjustment indications and warnings.
- Text displays: show switch settings and warn of misoperations.
- Zebra pattern: can be displayed to facilitate manual iris adjustment.
- Safety zone and center marker: indicate the effective picture area and the screen center.
- Warning indicator: lights or flashes if there is an operating problem when the unit is powered on or during operation.

Selectable video gain

The video amplifier has two increased gain settings, identified as "MID" and "HIGH", and you can set the values to be used for each of these settings to any values from 0 to 18 dB in 1 dB steps.
You can also use the automatic gain control function (AGC) to adjust the gain automatically according to the lighting conditions.

Automatic exposure function

The automatic exposure (AE) function adjusts the electronic shutter speed in steps of $^{1}/_{15000}$ s.

Wide lighting range

By using the auto iris function, and the AGC and AE functions together, there are a total of 12 exposure settings, to cope with a wide range of lighting conditions. You can also adjust the settings of the ranges.

Simultaneous recording

It is possible to record simultaneously on the built-in VTR and an external VTR such as a BVW-35/35P or VO-8800/8800P by using a CCZ or CCZQ cable (not supplied).

VTR Features

Betacam SP format

Superior video and audio characteristics

The Betacam SP format provides superior video and audio characteristics, with excellent signal-to-noise ratio, frequency characteristics, waveform characteristics, and detail reproduction. This offers a leap in both video and audio quality over conventional systems.

Compatibility with other Betacam SP VTRs

Metal tape cassettes recorded with this unit can be played back on any Betacam SP VTR, and a metal tape cassette recorded with any Betacam SP VTR can be played back on this unit.

Recording review function

When the unit is paused, this function allows you to play back the last few seconds of recording, for a quick check.

Built-in time code generator/reader

The time code generator/reader is built in, making it easy to record the time code required for precise editing.

High quality audio

- The external microphone supplied uses a 48 V phantom power supply to provide high audio quality.
- In addition to the external microphone supplied, you can connect another external microphone. The 48 V phantom power supply enables a wider selection of microphones to be used.
- The audio on the two longitudinal tracks uses the same Dolby-C noise reduction[1] as other Betacam SP VTRs. This is always enabled during both recording and playback.

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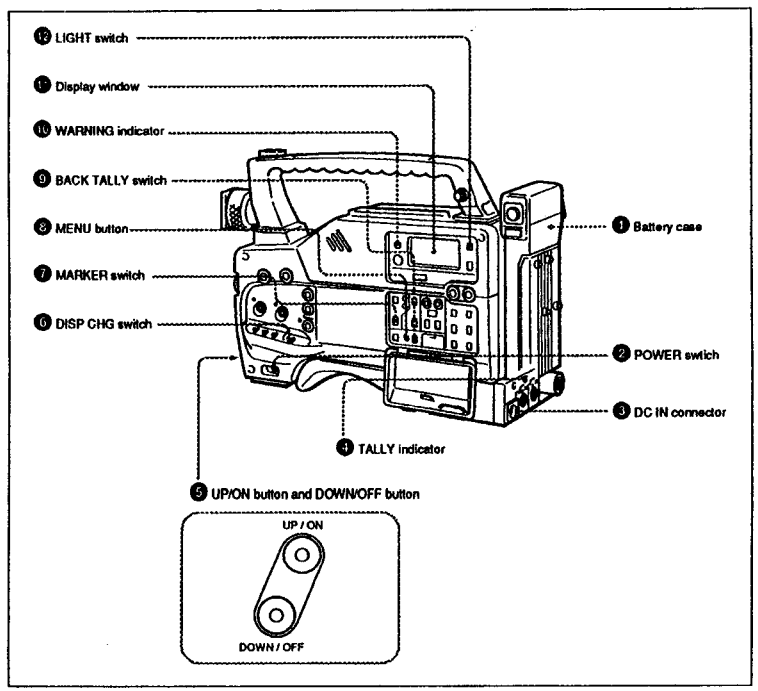
1) Dolby noise-reduction manufactured under license from Dolby Laboratories Licensing Corporation. Dolby and the double-D symbol ⧈ are trademarks of Dolby Laboratories Licensing Corporation.

Chapter 2
Location and Function of Parts

This chapter describes the location and function of the parts of the UVW-100K/100PK/100L/100PL which it is necessary to understand before operating the unit.

Power Supply and Display 2-2
Accessory Fittings and Input/Output Connectors 2-4
Audio Functions 2-6
Shooting and Recording/Playback Functions 2-8
Time Code Functions 2-11
VCL-713BX Zoom Lens 2-13
DXF-501/501CE Viewfinder 2-15

Power Supply and Display



Power supply and display

Power supply

❶ Battery case
Insert an NP-1B battery pack (not supplied).

For details of the battery loading procedure, see the section "Using the NP-1B Battery Packs" (page 3-19).

❷ POWER switch
This powers the unit on and off.

❸ DC IN connector (XLR 4-pin, male)
Use a CMA-8A/8ACE camera adaptor or AC-550/550CE AC adaptor to supply power from an outlet to this connector.

Indicators

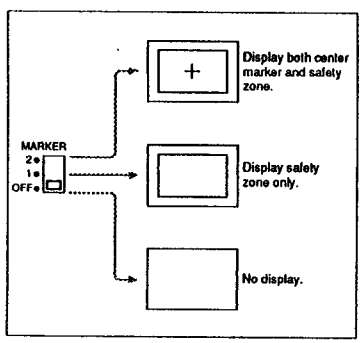
❹ TALLY indicator (red)
This lights while recording.
This indicator does not indicate whether the VTR connected to the EXT VTR connector is recording.

❺ UP/ON button and DOWN/OFF button
Used in conjunction with the DISP CHG switch to make camera settings.

❻ DISP CHG (display change) switch
Pushing this switch up or down changes the menu display on the viewfinder screen.

For details, see the section "Indications in the Viewfinder and Display Window" (page 4-8).

❼ MARKER switch
This selects whether to display the center marker and safety zone indication in the viewfinder.



MARKER switch settings

❽ MENU button
Use this button to access the VTR menu, for settings such as date and time, and drop-frame or non-drop-frame (NTSC).

For details see the section "Using the VTR Menu" (page 5-20).

❾ BACK TALLY switch
This switch determines whether or not the TALLY indicator operates.

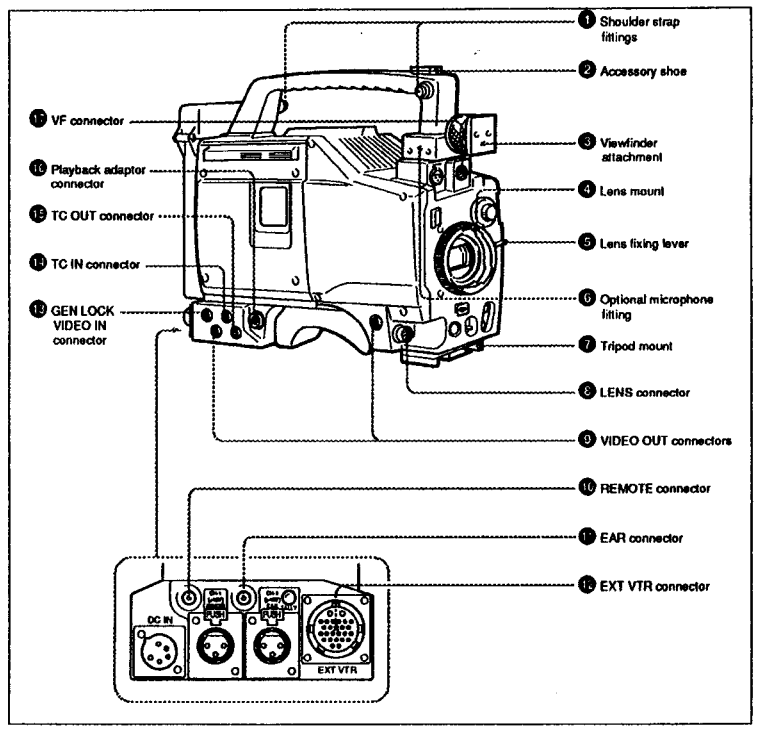
❿ WARNING indicator
This lights or flashes when there is an operating problem with the unit. This indicator does not work for the VTR connected to the EXT VTR connector.

For details, see the section "Warning System" (page 7-2)

⓫ Display window
This displays time values, audio levels, tape remaining, battery state, non-drop-frame (NDF) indication (for UVW-100K/100L only), warnings, and head drum operating hours.

⓬ LIGHT switch
This turns the display window lighting on or off.

Accessory Fittings and Input Output Connectors



Accessory fittings and input/output connectors

Accessory fittings

❶ Shoulder strap fittings
Use these to attach the supplied shoulder strap.

❷ Accessory shoe
Use this for attaching an optional accessory such as a video light.

❸ Viewfinder attachment
Attach the supplied DXF-501/501CE viewfinder.

❹ Lens mount
Use this for mounting the VCL-713BX zoom lens (supplied with the UVW-100K/100PK) or another zoom lens (not supplied).

⑥ Lens fixing lever
After inserting the lens in the lens mount, use this level to turn the lens mounting ring, to fix the lens in place.

⑧ Optional microphone fitting
You can attach the optional CAC-12 microphone holder here.

⑦ Tripod mount
When using the unit on a tripod, fix the VCT-U14 tripod adaptor supplied to this mount.

Input/output connectors

⑨ LENS connector (12-pin, for 2/3-inch lens connection)
Connect the lens cable when using a 2/3-inch lens with the LO-32BMT lens mount adaptor.

⑩ VIDEO OUT connectors (BNC × 2)
These output the video signal from the camera.

Note

It is not possible to monitor video being played back or recorded by the built-in VTR using these connectors.

⑪ REMOTE connector (mini-jack)
Connect an RM-81 remote control unit (not supplied). This controls starting and stopping of recording. You cannot use this connector to control an external VTR.

Note

Be careful not to confuse the REMOTE and EAR connectors, both of which are mini-jacks.

⑫ EAR connector (stereo mini-jack)
Connect an earphone or headphone. This outputs the sound which was output to the speaker, but mutes the speaker.

⑬ EXT VTR connector (CCZ, 26-pin)
Use a CCZ or CCZQ cable (not supplied) to connect an external VTR. You can then record the same signals on the external VTR as on the built-in VTR.

Note

It is not possible to connect a CCU-M5/M7 camera control unit.

⑭ GEN LOCK VIDEO IN connector (BNC)
When synchronizing the camera to an external signal, input a reference video signal (VBS[1] or BS [2]) from external equipment to this connector.

⑮ TC (time code) IN connector (BNC)
Input an external signal for synchronizing the built-in time code generator output signal. Use an SMPTE (for NTSC)/EBU (for PAL) longitudinal time code signal.

⑯ TC (time code) OUT connector (BNC)
Outputs the time code signal from the built-in time code generator. When a signal is input to the TC IN connector, this output signal is synchronized to it.

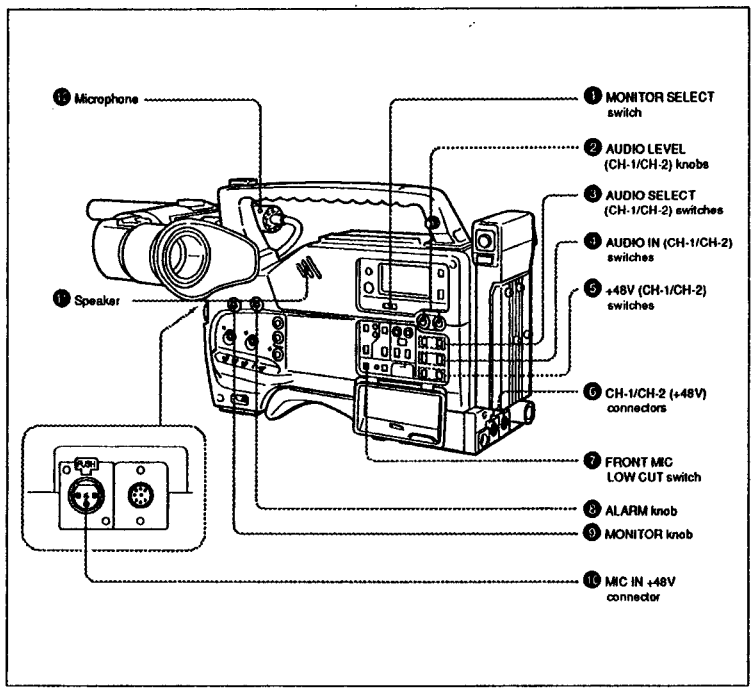
⑰ Playback adaptor connector (round, 20-pin)
For color playback monitoring from the built-in VTR, connect a VA-300/300P/500/500P playback adaptor (not supplied) to this connector.

⑱ VF (viewfinder) connector (8-pin)
Connect the viewfinder connector.

1) VBS: Video, Burst and Sync

2) BS: Burst and Sync

Audio Functions


⑭ Microphone
⑫ Speaker
① MONITOR SELECT switch
② AUDIO LEVEL (CH-1/CH-2) knobs
③ AUDIO SELECT (CH-1/CH-2) switches
④ AUDIO IN (CH-1/CH-2) switches
⑤ +48V (CH-1/CH-2) switches
⑥ CH-1/CH-2 (+48V) connectors
⑦ FRONT MIC LOW CUT switch
⑧ ALARM knob
⑨ MONITOR knob
⑩ MIC IN +48V connector

Audio functions

① MONITOR SELECT switch
This selects the audio output to the speaker or earphones.
CH-1: channel 1 audio
MIX: channels 1 and 2 mixed
CH-2: channel 2 audio
EXT VTR: the sound selected by an external VTR connected to the EXT VTR connector

② AUDIO LEVEL (CH-1/CH-2) knobs
When the AUDIO SELECT (CH-1/CH-2) switches are set to MAN, these knobs adjust the audio recording levels on the corresponding channels.

The audio levels are shown in the display window. For details, see the section "Indications in the Display Window" (page 4-17).

③ AUDIO SELECT (CH-1/CH-2) switches
These select the audio level adjustment method for each of channels 1 and 2.
AUTO: Use the AGC circuit to adjust the audio level automatically.
MAN: Adjust the audio level manually, using the AUDIO LEVEL (CH-1/CH-2) knobs. There is a limiter circuit to prevent excess levels, thus allowing recording with low distortion.

❹ AUDIO IN (CH-1/CH-2) switches
These select the input signals to audio channels 1 and 2.
FRONT: The signal from the microphone connected to the MIC IN +48V connector
REAR MIC: The signal from a microphone connected to the CH-1/CH-2 (+48V) connectors
REAR LINE: The line signal connected to the CH-1/CH-2 (+48V) connectors

❺ +48V (CH-1/CH-2) switches
These switches control the 48 V power supply to the CH-1/CH-2 (+48V) connectors. When one of these switches is on, the corresponding one of the AUDIO IN (CH-1/CH-2) switches should be set to REAR MIC, and the corresponding connector can be used for a microphone requiring a 48 V supply.

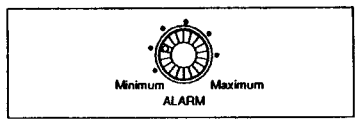
Note

If you connect a microphone not compatible with a 48 V supply to one of the CH-1/CH-2 (+48V) connectors while the corresponding one of the +48V (CH-1/CH-2) switches is in the ON position, the microphone may be damaged. Check the power supply used by the microphone and the switch settings before making the connection.

❻ CH-1/CH-2 (+48V) connectors (XLR 3-pin, female)
Connect a microphone or external equipment to each of these connectors.
When using a signal input to either of these connectors, set the corresponding AUDIO IN (CH-1/CH-2) switch to REAR MIC or REAR LINE, depending on the equipment connected.

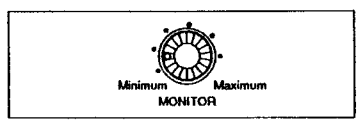
❼ FRONT MIC LOW CUT switch
This applies a high-pass filter to the input from the microphone connected to the MIC IN +48V connector. This reduces wind noise.

❽ ALARM knob
This controls the volume of the warning sound given on the speaker or from the EAR connector. On the minimum setting, the warning sound is not audible at all.



ALARM knob

❾ MONITOR knob
This controls the volume of the sound other than the warning on the speaker or from the EAR connector. On the minimum setting, the sound is not audible at all.



MONITOR knob

❿ MIC IN +48V connector (XLR 3-pin, female)
Connect the supplied microphone (or another microphone).

Note

This connector is for a microphone using a 48 V phantom power supply only. Using a microphone not designed to use a +48 V phantom power supply may result in damage.

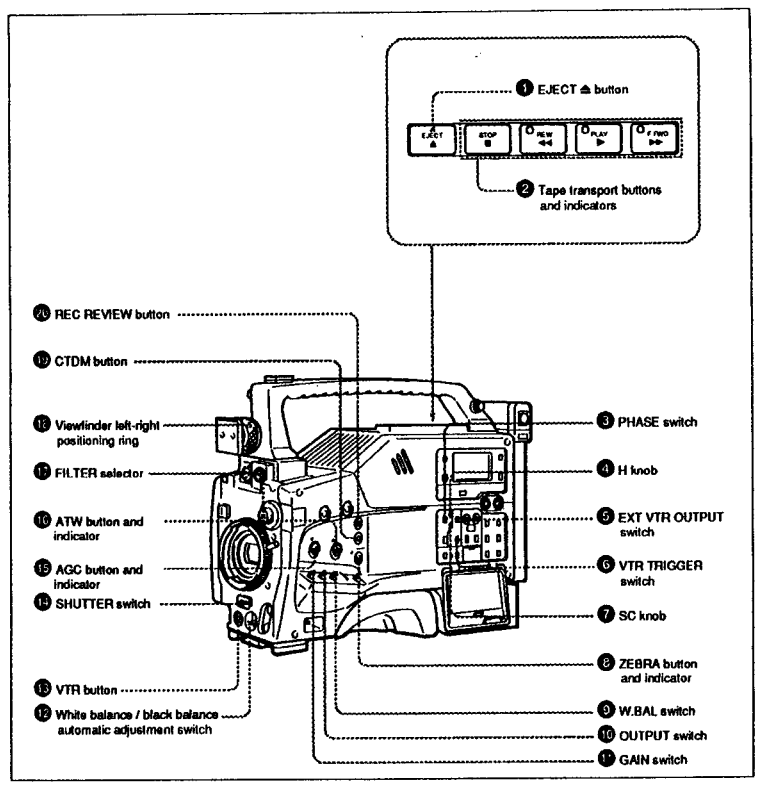
⓫ Speaker
During recording the speaker relays the input audio signal in E-E mode [1], and during playback it outputs the playback audio. The speaker also sounds a warning tone when there is an error indication in the viewfinder or display window. If an earphone is connected to the EAR connector, the speaker does not sound.

For details of the warning tone, see the section "Warning System" (page 7-2).

⓬ Microphone
This is a directional microphone, using a +48 V phantom power supply.

1) **E-E mode:** Electric-to-Electric mode. The input signals which pass through the recorder's electronics are supplied from the output connectors.

Shooting and Recording/Playback Functions


❶ EJECT ⏏ button
❷ Tape transport buttons and indicators
⓴ REC REVIEW button
⓱ CTDM button
⓭ Viewfinder left-right positioning ring
⓯ FILTER selector
⓰ ATW button and indicator
⓯ AGC button and indicator
⓮ SHUTTER switch
⓭ VTR button
⓬ White balance / black balance automatic adjustment switch
❸ PHASE switch
❹ H knob
❺ EXT VTR OUTPUT switch
❻ VTR TRIGGER switch
❼ SC knob
❽ ZEBRA button and indicator
❾ W.BAL switch
❿ OUTPUT switch
⓫ GAIN switch
Shooting and recording/playback functions

Front panel

❶ EJECT⏏button
Press this button to open the cassette holder.

❷ Tape transport buttons and indicators
These control the tape transport as follows.

REW ◀◀: Rewinds the tape. While the tape is being rewound, the indicator lights.
F FWD ▶▶: Fast forwards the tape. While the tape is being fast forwarded, the indicator lights.
PLAY ▶: Plays back the recorded video. During playback, the indicator lights.
STOP ■: Stops the tape

Note

During recording, none of these buttons operates.

❸ PHASE switch
Select 0° or 180° for the subcarrier [1] phase setting to synchronize the camera with an external synchronization signal input to the GEN LOCK VIDEO IN connector.

❹ H (horizontal) knob
Use to adjust the relative horizontal phases of an external signal and the video output of the camera.

❺ EXT (external) VTR OUTPUT switch
Use this switch to select the output video signal according to the type of external VTR connected to the EXT VTR connector.
1: component output or VBS output
2: Y/C output

❻ VTR TRIGGER switch
When an external VTR is connected to the EXT VTR connector, use this switch to select the effect of the VTR button on the camera and the VTR button on the VCL-713BX zoom lens.
PARALLEL: Pressing either of the VTR buttons starts or stops both the built-in VTR and the external VTR.
INT ONLY: Pressing either of the VTR buttons starts or stops the built-in VTR only. You can operate the external VTR independently.
EXT ONLY: Pressing either of the VTR buttons starts or stops the external VTR only.

Note

This switch only takes effect when there is an external VTR connected to the EXT VTR connector, and powered on. In all other cases, this switch has no effect on the operation of the VTR button on either the camera or the VCL-713BX zoom lens.

❼ SC (subcarrier) knob
Use to adjust the relative subcarrier phases of an external signal and the video output of the camera.

❽ ZEBRA button and indicator (green)
To display the zebra pattern, press this button. When making manual iris adjustment, adjust the iris until the zebra pattern appears on the most important part of the image (for example, the face of a person interviewed against strong backlighting).

❾ W.BAL (white balance) switch
This switch selects the method of white balance adjustment.
PRE: Adjust the white balance to the factory preset color temperature[2] value (3200 K or 5600 K) corresponding to the setting of the FILTER selector.
A or B: Use one of these settings for automatic white balance adjustment.
Pushing the white balance / black balance automatic adjustment switch to the WHT position carries out automatic white balance adjustment, and stores the value obtained in the corresponding memory, A or B.

Note

When the ATW indicator is lit, the ATW function operates regardless of the position of this switch.

❿ OUTPUT switch
This selects the output signal of the camera.
BARS: Outputs a color bar signal.
CAM: Outputs the signal from the camera.

⓫ GAIN switch
This selects the gain of the camera video circuits.
0dB: Normal video gain. The switch should normally be left in this position.
MID: Increase the gain to the current "MID" setting (default value +9 dB).
HIGH: Increase the gain to the current "HIGH" setting (default value +18 dB).

For details, of the "MID" and "HIGH" settings, see the section "Gain settings" (page 5-3).

1) **Subcarrier:** Color information contained in a composite video signal.

2) **Color temperature:** The color quality of lights, expressed in Kelvins (K). Color temperature is higher when the color is reddish and lower when bluish.

⓬ White balance / black balance automatic adjustment switch
Carries out automatic adjustment of the white balance and black set and black balance.
WHT: Carries out automatic white balance adjustment. When the W.BAL switch is in the A or B position, this also stores the value obtained in the corresponding memory, A or B.
BLK: Carries out automatic black set and black balance adjustment and stores the value obtained in memory. The W.BAL switch position has no effect.

⓭ VTR button
Starts and stops recording.

⓮ SHUTTER switch
Enables and disables the electronic shutter and clear scan function.
ON: Enables the electronic shutter and clear scan function. Set the SHUTTER switch to this position also when selecting the shutter speed, or the scanning frequency for the clear scan function.
OFF: Disables the electronic shutter and clear scan function. (Normally leave in this position.)

⓯ AGC (automatic gain control) button and indicator (orange)
For automatic gain control according to the lighting conditions, press this button.

For details of the AGC function, see the section "Automatic gain control" (page 5-4).

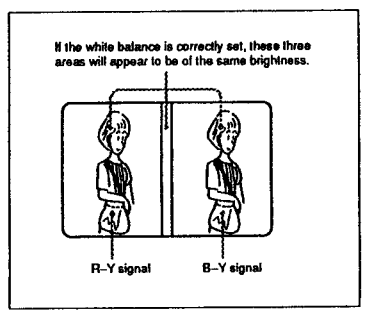
⓰ ATW (auto-tracing white balance) button and indicator (orange)
Press this button to enable the ATW function. This automatically adjusts the white balance in conditions where the lighting source is continually changing.

For details of the ATW function, see the section "Using the ATW function" (page 3-30).

⓱ FILTER selector
Turn this to select the appropriate internal filter for the lighting conditions.

⓲ Viewfinder left-right positioning ring
Loosen this ring to move the viewfinder to the right or left.

⓳ CTDM button
This is for CTDM [1] playback. To check the color difference signals during playback, hold down this button. The R–Y and B–Y signals appear in monochrome on the left and right halves of the split screen.

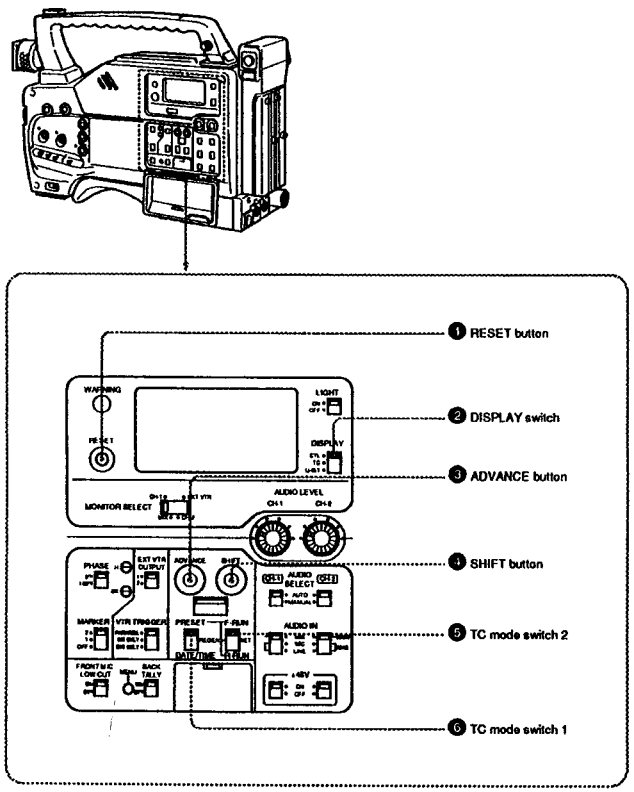


Checking the color difference signals

⓴ REC REVIEW button
Press this button to review the last few seconds of the recording.

1) CTDM: Compressed Time Division Multiplex. Because the two color difference signals (R–Y and B–Y) have a much smaller bandwidth than the luminance signal, they can be compressed by a factor of two in time, and multiplexed into a single signal.

Time Code Functions



Time code functions

❶ RESET button

This resets the counter indication shown in the display window. The effect of this button depends on the settings of the DISPLAY switch and TC mode switch 1 and 2, as shown in the following table.

RESET button effect

Switch settings	RESET button effect
DISPLAY: CTL	Resets the CTL count to "00:00:00:00".
DISPLAY: TC TC mode 1: PRESET TC mode 2: SET	Resets the time code value to "00:00:00:00".
DISPLAY: U-BIT TC mode 1: PRESET TC mode 2: SET	Resets the user bit[a] value to "00 00 00 00".

a) User bits: A 32-bit section of time code in which a user can record necessary information.

❷ DISPLAY switch

This selects the value to be shown in the time value indication in the display window.

CTL: Shows a count of the playback or recording CTL (control) signal pulses expressed in hours, minutes, seconds and frames.

TC: Shows the SMPTE (for NTSC)/EBU (for PAL) time code value.

U-BIT: Shows the user bit value within the SMPTE (for NTSC)/EBU (for PAL) time code.

For details of the display window indications, see the section "Indications in the Display Window" (page 4-17).

❸ ADVANCE button

When setting time code and user bit values, pressing this button increments the digit selected with the SHIFT button.

❹ SHIFT button

When setting time code and user bit values, press this button to select the digit to be incremented with the ADVANCE button.
The selected digit flashes.

For details of the method of setting time code and user bit values, see the sections "Setting the Time Code Value" (page 6-3) and "Setting the User Bit Value" (page 6-5), respectively.

❺ TC (time code) mode switch 2

This switch determines the way in which time code values advance when TC mode switch 1 is set to PRESET.

R-RUN: The time code advances only during recording. Consecutive recordings on the tape have consecutive time code values.

SET: Set the switch to this position to set the time code or user bit value.

F-RUN: Free-run mode. The time code advances continuously, whether or not the VTR is recording. Thus the time code value can be aligned with real time.

Note

In NTSC systems, there are two time code operation modes: drop-frame (DF) and non-drop-frame (NDF). The unit (UVW-100K/100L) is shipped with drop-frame mode selected.

For details of how to select drop-frame or non-drop-frame mode, see the section "Selecting drop-frame/non-drop-frame mode (NTSC)" (page 5-22), and for the meanings of these modes, see the section "Drop-frame mode" (page 6-4).

❻ TC (time code) mode switch 1

This switch determines whether the time code for a recording is made continuous from the previous recording on the tape, or starts afresh.

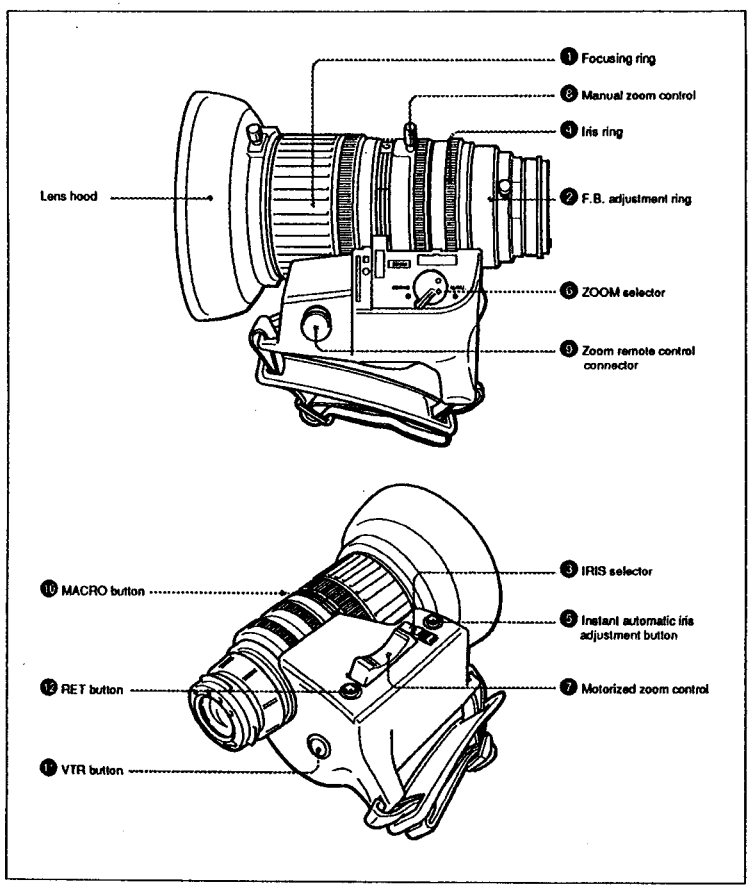
REGEN: Reads the existing time code on the tape, and sets the time code starting value accordingly. Thus, even when there is an indefinite break in recording, this setting ensures that time codes on the tape will be continuous. Regardless of the setting of TC mode switch 2, in this position the unit is always in R-RUN mode.

PRESET: Starts recording time code values on the tape from the currently set value.

DATE/TIME: This synchronizes the time code to the real time clock (set in the VTR menu). In this case the time code is recorded in drop-frame mode (NTSC).

For details see the section "Using the VTR Menu" (page 5-20).

VCL-713BX Zoom Lens



VCL-713BX zoom lens

VCL-713BX Zoom Lens

Focusing

❶ Focusing ring
Turn this ring to focus the lens.

❷ F.B. (flangeback) adjustment ring
To adjust the flangeback distance (the distance from the flange to the focal plane of the lens), release the screw on the ring, then turn the ring.

Iris adjustment

❸ IRIS selector
Selects the method of iris adjustment.
A: automatic adjustment
M: manual adjustment

❹ Iris ring
When the IRIS selector is set to M, turn this ring to adjust the iris manually. Manual iris adjustment is useful, for example, when shooting against backlighting.

❺ Instant automatic iris adjustment button
When the IRIS selector is set to M, pressing this button switches to automatic iris adjustment. While the button is pressed, the iris is adjusted automatically; when you release it, the iris setting is preserved but the camera returns to manual adjustment.

Zoom controls

❻ ZOOM selector
Selects the method of zoom operation.
SERVO: motorized zoom control
MANU.: manual zoom control

❼ Motorized zoom control
When the ZOOM selector is set to SERVO, use this control to operate the zoom lens. Press the appropriate end of the control to zoom in or out.
W (wide angle): zoom out.
T (telephoto): zoom in.
The control is pressure sensitive: the harder you press, the faster the lens zooms. If the subject is in focus in the telephoto position, it will remain in focus when you zoom out to wide angle.

❽ Manual zoom control
Turn this control to control the zoom when the ZOOM selector is set to MANU.

❾ Zoom remote control connector (8-pin)
For remote control of the zoom, connect an LO-26 lens remote control unit (not supplied).

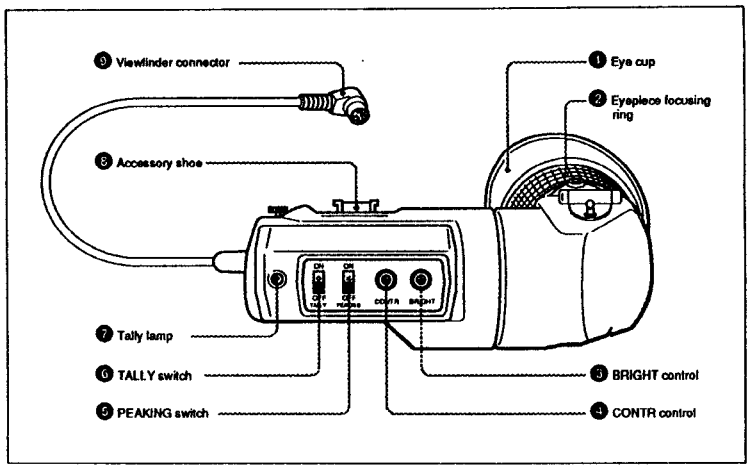
❿ MACRO button
For close-ups, hold down this button, then turn the manual zoom control to focus. The minimum distance from the front of the lens to the subject is 50 mm.

VTR control

⓫ VTR button
Starts and stops recording. This button has the same effect as the VTR button on the camera body.

⓬ RET (return) button
Press this button to view the return video from an external VTR connected to the EXT VTR connector in the viewfinder.

DXF-501/501CE Viewfinder



DXF-501/501CE Viewfinder

1 Eye cup
Put this to your eye to use the viewfinder.

2 Eyepiece focusing ring
Adjust the eyepiece focus to suit your eyesight.

3 BRIGHT (brightness) control
Adjusts the brightness of the viewfinder image.

4 CONTR (contrast) control
Adjusts the contrast of the viewfinder image.

5 PEAKING switch
Provides edge enhancement of the viewfinder image, making lens focusing easier.

6 TALLY switch
Enables or disables the tally lamp.

7 Tally lamp (red)
When the TALLY switch is in the ON position, this tally lamp has the same effect as the REC/TALLY indicator in the viewfinder.

8 Accessory shoe (U 1/4" - 20 UNC, screw length: 6 mm max.)
This shoe accepts accessories such as video lights.

9 Viewfinder connector
Connect to the VF connector on the camera body.

Chapter 3
Setting Up the Unit

This chapter describes the preparations for using the unit, including the fitting of accessories and connections required for shooting.

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Notes on Operation

Safety Notes

Power supply
The unit operates on a 12 V DC supply. Use only the specified power supplies.

Do not disassemble
The unit includes precision components: do not attempt to disassemble it, as this can lead to malfunction. The viewfinder also contains high voltage components with a danger of electric shock.

Foreign bodies
Be careful not to let any foreign bodies, especially metallic objects or water, get inside the unit, as this can lead to malfunction.

Looking After the Unit

Zoom lens
If the zoom lens is not correctly attached to the camera body it can be damaged. Follow the mounting instructions in the section "Mounting the Lens" *(page 3-5)* carefully.

Do not cover with cloth
While the camera is in operation, do not cover it with a cloth or other material. This can cause the temperature to rise, leading to a malfunction.

Use and storage locations
Avoid using or storing the unit in the following places:
- Where it is subject to extremes of temperature (outside 0 °C to 40 °C) (32 °F to 104 °F).
  Note that in summer the temperature in a car with the windows closed can reach 50 °C (122 °F).
- Very damp or dusty places.
- Where rain is likely to reach the camera.
- Places subject to severe vibration.
- Near strong magnetic fields such as radio or TV transmitters.

Viewfinder
- Do not leave the viewfinder so that sunlight can enter the eyepiece lens. It is possible for sunlight focused by the eyepiece to cause very high temperatures, and melt the inside of the viewfinder.
- Do not use the viewfinder in strong magnetic fields. This can distort the picture on the viewfinder screen.

After use
Turn the power switch off.

When not used for a period of time
Remove the battery pack.

Shipping
When transporting the unit, as far as possible use either the carrying case or the original packing.
If shipping the unit as freight by truck, ship or airplane, pack it in the carrying case, then pack the carrying case in its own packing or similar.

Care
Remove dust from optical surfaces of the lens and filters with a blower brush. If the body of the unit is dirty, wipe it with a dry cloth. For severe dirt, use a soft cloth steeped in a small amount of neutral detergent, then wipe dry. Do not use volatile solvents such as alcohol or thinners, as these may damage the finish.

In the event of problems
Contact your local Sony service representative.

Condensation

If you move the unit suddenly from a very cold place to a warm place, or use it in a very humid location, condensation may form on the head drum. If the unit is operated in this state, the tape may adhere to the drum, and cause a failure or even permanent damage. Take the following steps to prevent this from happening:

- Remove the cassette before moving the unit from a very cold place to a warm place.
- Before inserting a cassette, turn the power on, and check that the HUMID indication is not showing in the display window. If it is showing, condensation is present: do not insert a cassette, and wait until the condensation has disappeared. At this point the condensation will evaporate more rapidly if you leave the unit powered on.
- If condensation occurs while a cassette is loaded, the unit stops operating. Press the EJECT button to remove the cassette, and wait until the HUMID indication disappears.
- Once condensation has occurred, it may take a considerable time before the unit can be operated. As far as possible, keep the unit in a place at normal temperature and low humidity.

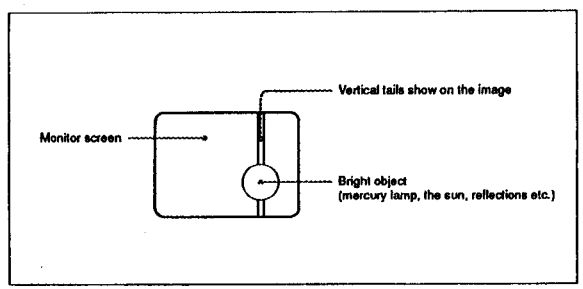
For details of cassette insertion and removal, see the section "Inserting and Removing the cassette" (page 4-3), and for details of the HUMID indication, see the section "Warning System" (page 7-2).

CCD Camera Imaging Characteristics

The following phenomena are typical of the operation of a CCD imager, and do not indicate a malfunction.

Smear

Smear produces vertical streaks, and tends to be produced when an extremely bright object is being shot.



Vertical smear

White dots

White dots may appear in the image if the unit is operated at very high temperatures.

Aliasing

When patterns of stripes or lines are shot, they may appear jagged.

Picture quality using the electronic shutter

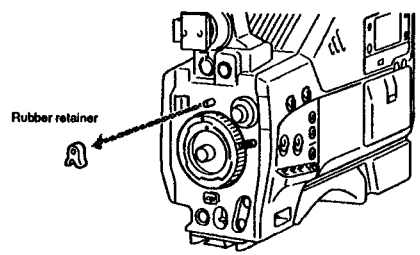
If you are using the electronic shutter with the gain set to a high value (such as 18 dB), the picture quality may be impaired. As far as possible use the electronic shutter only under lighting conditions where you can obtain a clear picture with the GAIN selector set to the 0 dB position.

Attaching Accessories

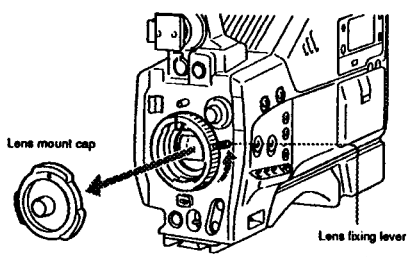
Mounting the Lens

For the UVW-100K/100PK, use the supplied VCL-713BX zoom lens. In other cases, before mounting the lens, check that it is appropriate for a Sony 1/2-inch bayonet mount.

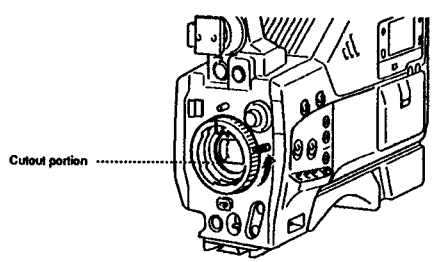
1 Using your fingers, pull off the rubber retainer which prevents the lens mount from turning.



2 Push up the lens fixing lever and remove the lens mount cap from the lens mount.

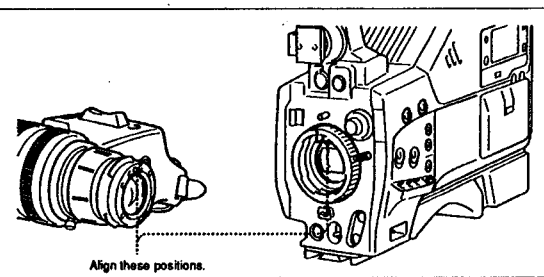


3 Turn the lens fixing lever fully counterclockwise.

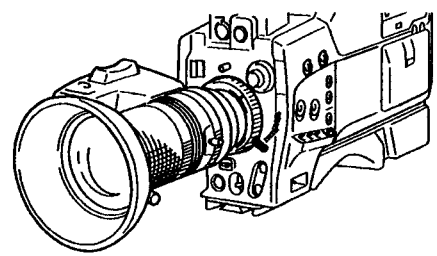


(Continued)

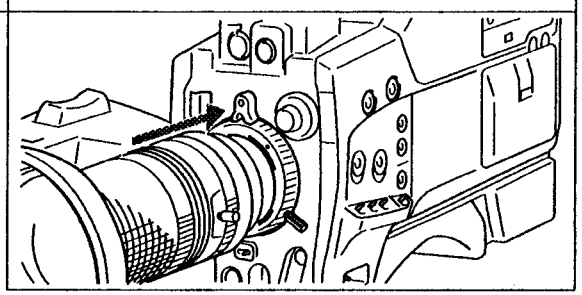
4 Align the lens with the lens mount, and insert the lens into the mount.



5 Supporting the lens, push down the lens fixing lever and turn the ring firmly to fix the lens.



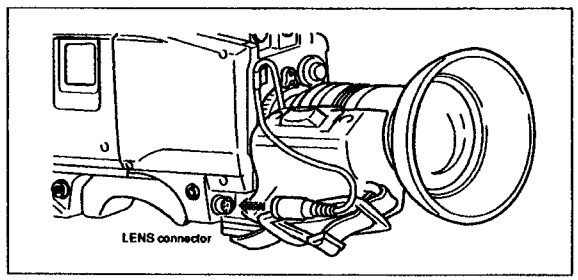
6 Replace the rubber retainer.



Mounting a 2/3-inch lens

It is not possible to mount a 2/3-inch lens directly. It is necessary to obtain an LO-32BMT lens mount adaptor.

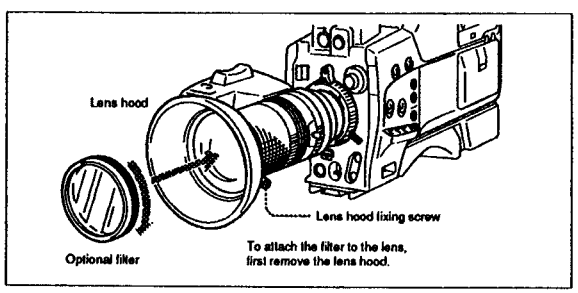
After completing steps 1 to 6 of the procedure above, fit the lens cable to the LENS connector.



Connecting the lens cable

Using optional filters

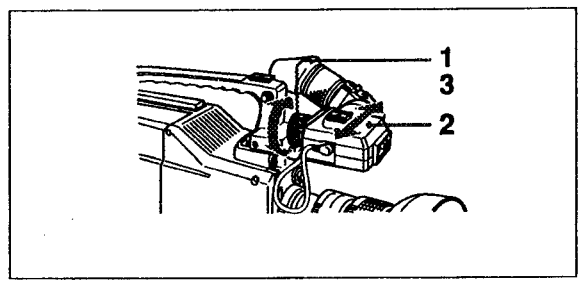
An optional filter can be fitted either to the lens hood or to the lens barrel.
To attach the optional filter to the lens, first loosen the lens hood fixing screw, then remove the lens hood.
Turn the filter clockwise to screw it into place.



Fitting an optional filter

Adjusting the Viewfinder Position

Adjusting to left or right



Adjusting to left or right

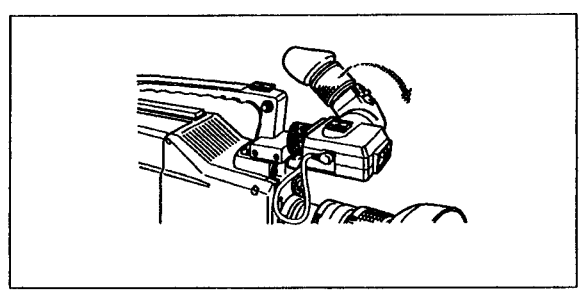
1 Loosen the viewfinder left-right positioning ring.

2 Slide the viewfinder sideways to the most convenient position.

3 Tighten the viewfinder left-right positioning ring.

Adjusting the position vertically

Move the eyepiece to adjust the vertical position.



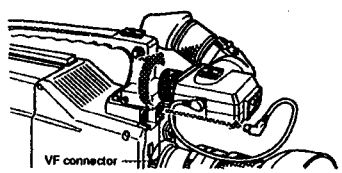
Adjusting the vertical position

Detaching the Viewfinder

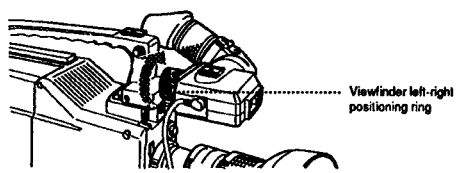
Before the following procedure, first remove the microphone holder from the viewfinder.

For details of how to remove the microphone, see the section "Removing the supplied microphone holder" (page 3-10).

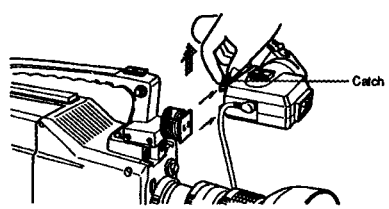
1 Remove the viewfinder connector from the VF connector of the camcorder, and remove the viewfinder cable from the cable clamp.



2 Loosen the viewfinder left-right positioning ring.



3 Pull the viewfinder out sideways, pulling up the catch.



Fitting the viewfinder

Reverse the above procedure.

When using this unit in a studio, for example, you can replace the supplied DXF-501/501CE 1.5-inch viewfinder by the optional DXF-40B/40BCE 4-inch viewfinder or DXF-50B/50BCE 5-inch viewfinder. For how to fit the optional viewfinder, refer to the operating instructions supplied with the optional viewfinder.

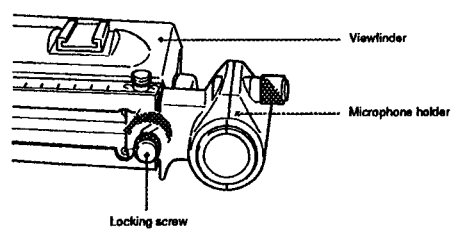
Mounting an Optional Microphone

To use a long microphone such as the ECM-672 (not supplied), first remove the supplied microphone holder, then fit a CAC-12 microphone holder (not supplied).

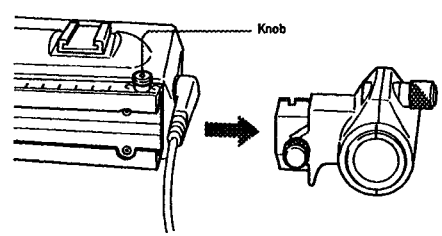
Removing the supplied microphone holder

Use the following procedure to remove the supplied microphone holder from the end of the viewfinder.

1 Loosen the microphone holder locking screw.

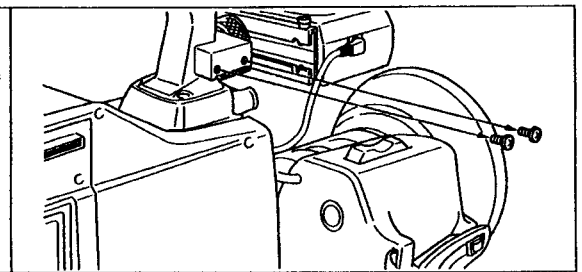


2 Lifting the knob on the end of the viewfinder, pull out the microphone holder.

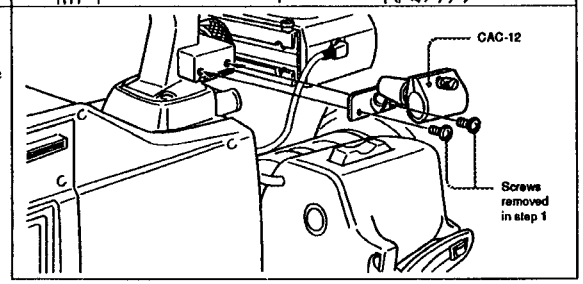


Fitting the optional CAC-12 microphone holder

1 Remove the two screws from the optional microphone fitting.

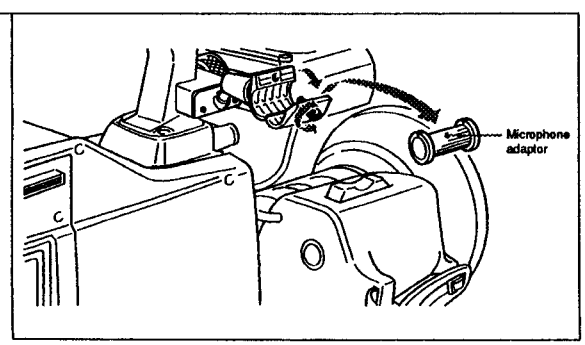


2 Use the two screws to fasten the CAC-12 microphone holder.



Attaching the microphone

1 Undo the microphone holder fastening screw, then open the microphone holder and remove the microphone adaptor.



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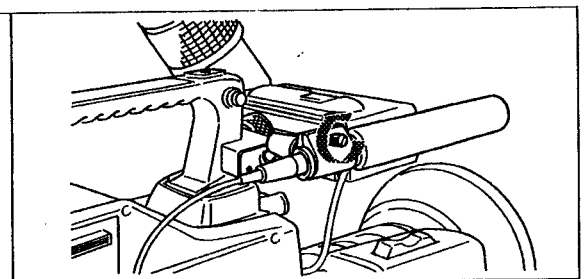
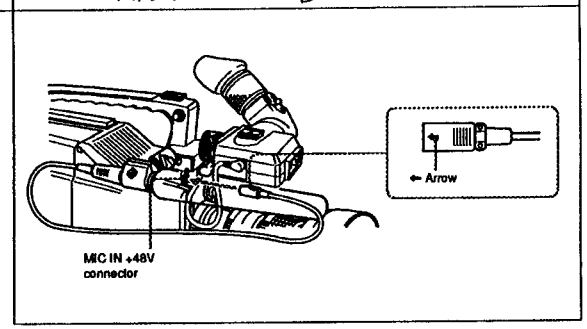
Attaching Accessories

2 Insert the microphone in the microphone holder, then close the holder and tighten the screw.



3 Insert the microphone connector into the MIC IN +48V connector, aligning the arrow uppermost, and fasten the cable with the clamp.



Detaching the microphone

Reverse the above procedure for attaching the microphone.
When removing the microphone connector from the MIC IN +48V connector, press in the button on the top of the connector.

Storing the unit in the carrying case

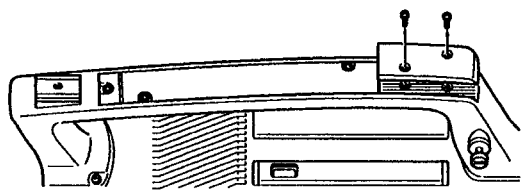
The unit fits in the carrying case with the microphone in place.
If, however, you are using an optional microphone with the CAC-12 microphone holder, before stowing the unit, slacken the microphone fixing screw, lower the microphone, and retighten the screw.

Mounting a Video Light

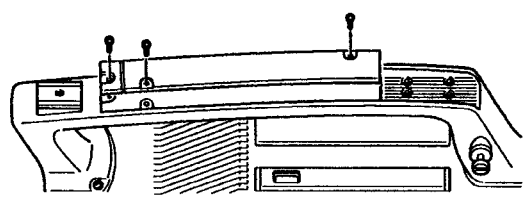
If you mount a video light on the accessory shoe at the front of the carrying handle, you can use the following procedure to pass the power cable for the light through the carrying handle.

For details of how to fit the video light to the accessory shoe and the necessary power connections, refer to the operating instructions supplied with the light.

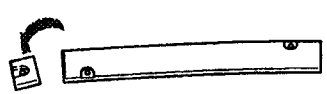
1 Remove the cover at the rear end of the carrying handle.



2 Remove the cover at the front end of the carrying handle.



3 Bend the front end of the cover removed in step **2** to break it off at the scored line.



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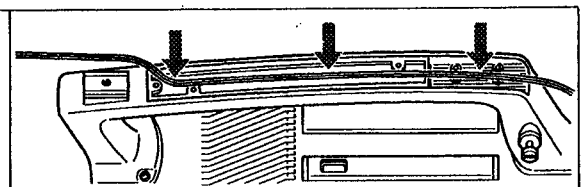
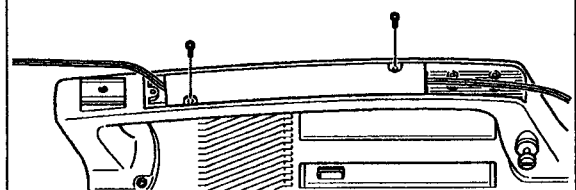
4 Lay the video light power cable in the slot along the top of the carrying handle.



5 Ensuring that the power cable is neatly tucked into place in the slot, replace the cover removed in step **2**, and fasten with screws. (When using a video light in this way, the rear cover removed in step **1** is not used.)

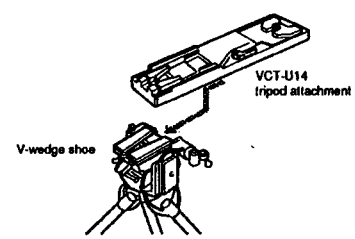


Tripod Mounting

Use the VCT-U14 tripod attachment to mount the camcorder on a tripod.

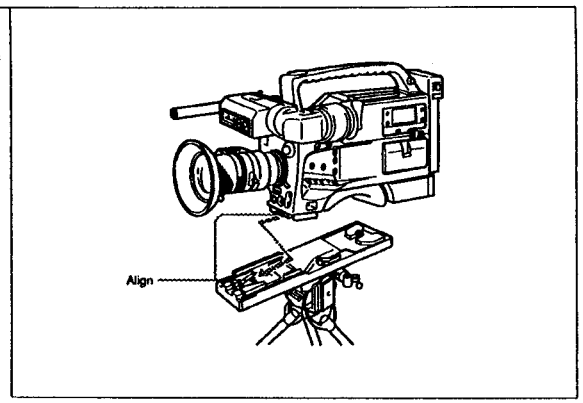
Mounting the tripod attachment on a tripod

1 Attach the supplied V-wedge shoe to the tripod, then insert the tripod attachment into the V-wedge shoe.



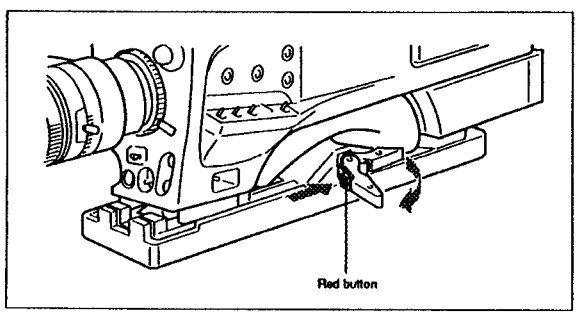
If there is no V-wedge shoe for the tripod, select the screw hole in the tripod attachment which gives the best balance for the camcorder, and use a fixing screw of an appropriate size to fix the tripod attachment to the tripod.

2 Align the projection on the bottom of the camcorder with the groove in the tripod attachment, then slide the camcorder forward along the groove in the tripod attachment until it clicks into place.



Detaching the camcorder from the tripod attachment

Holding down the red button on the tripod attachment, push the lever forward in the direction of the arrow, to unlock the camcorder. Then slide the camcorder back to remove from the tripod attachment.

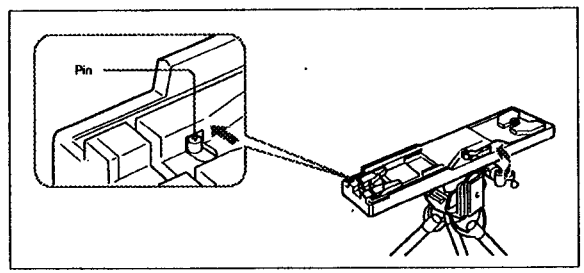


Detaching the camcorder from the tripod attachment

Attaching Accessories

Check after removing the camcorder

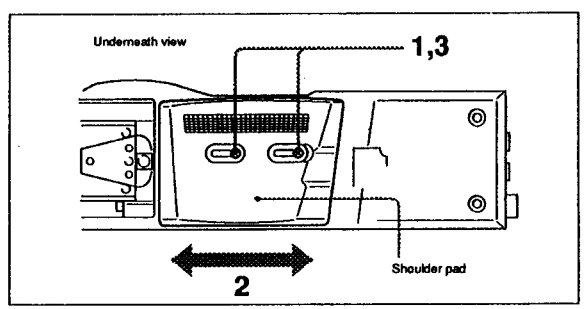
It is possible for the tripod attachment pin to remain in the engaged position even after the camcorder is removed. If this happens, once again hold the red button in and move the lever in the direction of the arrow, until the pin returns to its stowed position. If the pin remains in the engaged position it will not be possible to mount the camera.



Returning the tripod attachment pin to its stowed position

Adjusting the Shoulder Pad Position

The position of the shoulder pad is adjustable by 10 mm (0.4 inches) forward or back from the central position (factory shipped position). Use this adjustment to get the best balance for shooting with the camcorder on your shoulder.



Adjusting the shoulder pad position

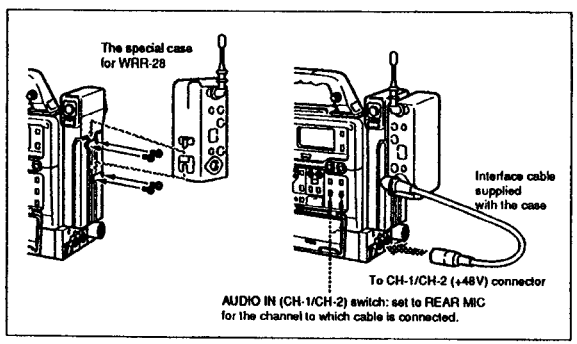
1 Loosen the two screws.

2 Slide the shoulder pad to the front or the rear, until it is in the most convenient position.

3 Tighten the screws.

Connecting a Wireless Microphone System

Using separately available components such as the WRT-57/67 wireless microphone and WRR-28/830 UHF portable tuner, you can use a Sony wireless microphone system as an audio input source.
To connect a WRR-28 to this unit, use the special case attached to the back of the camcorder, as shown in the following figure.

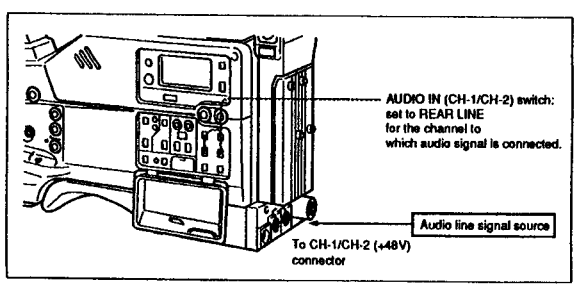

The special case for WRR-28
Interface cable supplied with the case
To CH-1/CH-2 (+48V) connector
AUDIO IN (CH-1/CH-2) switch: set to REAR MIC for the channel to which cable is connected.

Connecting a wireless microphone system

For details of operation of the wireless microphone system, refer to the operating instructions supplied with the wireless microphone system.

Connecting Audio Line Signals

Connect an external audio line signal from a stereo amplifier or other equipment as shown in the following figure.

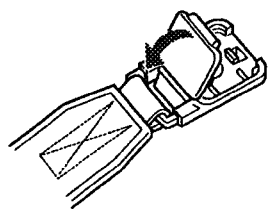

AUDIO IN (CH-1/CH-2) switch: set to REAR LINE for the channel to which audio signal is connected.
Audio line signal source
To CH-1/CH-2 (+48V) connector

Connecting audio line signals

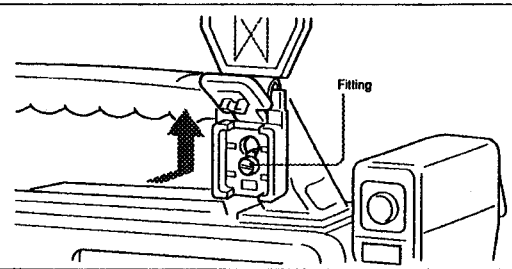
Fitting the Shoulder Strap

To use the shoulder strap for carrying the camcorder, use the following procedure to fasten it to the fitting points.

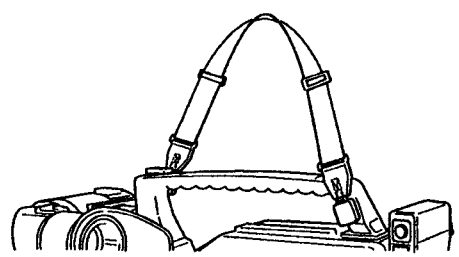
1 Open the cover of the fastener on one end of the shoulder strap.



2 Hook the fastener over the camcorder fitting and close the cover.



3 Attach the other end of the strap in the same way.



Removing the shoulder strap

Reverse the above procedure to remove the shoulder strap.

Connecting a Remote Control Unit

By connecting an optional RM-81 remote control unit to the REMOTE connector, you can start and stop recording by remote control.

Notes

- Always turn off the power switch on the camcorder before connecting or disconnecting the remote control unit.
- Be careful not to confuse the REMOTE connector with the EAR connector on the right side of the unit.

For details of operation, refer to the operation manual for the RM-81 remote control unit.

Power Sources

This unit can operate from either a battery pack or an AC power supply.

Anton Bauer Magnum Battery System and Superlight System
Equipping the unit with a special battery mount developed by Anton Bauer Corporation enables you to use the Anton Bauer Magnum battery and the Anton Bauer Superlight System.

For details, contact a dealer of Anton Bauer products.

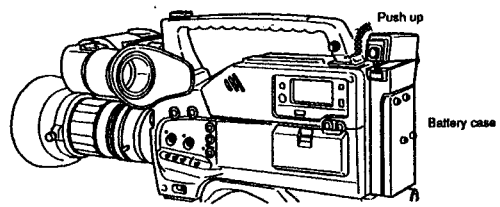
Using the NP-1B Battery Pack

Before use, always charge the battery pack with a BC-1WB battery charger.

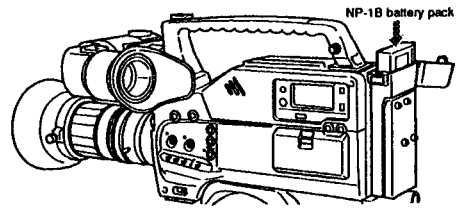
Notes on using a battery pack

- Do not allow metal objects to come into contact with the metal parts of the battery pack. There is a danger of a short circuit.
- When not using the unit for a considerable period, remove the battery pack.
- Immediately after use the battery pack is somewhat warm. It may not be possible to charge it fully while it is still warm.

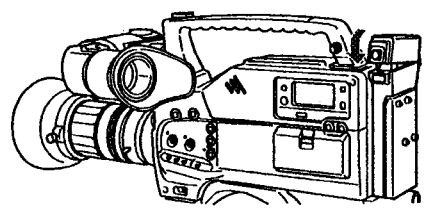
1 Open the cover of the battery case.



2 Insert a fully-charged battery pack.



3 Close the cover of the battery case.



Battery pack operating time

The unit will operate for about 60 minutes of continuous recording using a fully-charged NP-1B battery pack at normal temperatures. Very low temperatures may reduce the operation time.

Battery capacity indication

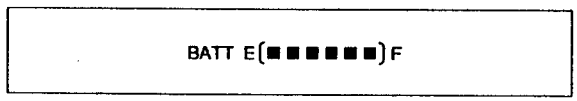
When the battery pack is almost exhausted, the indication "LOW BATT." appears in the viewfinder. At this point, replace with another fully-charged battery pack. If you continue to operate the unit without replacing the battery pack, the BATT indicator in the viewfinder also lights, and the "BATT.END" indication appears on the viewfinder screen.

Note on battery pack replacement

Always power off the unit before replacing the battery pack.

Checking the battery level

When the POWER switch is on, the BATT indication in the display window shows the battery level. If the battery pack is fully charged, there are six marks visible between "E" and "F".



Checking the battery level with the BATT indication

Using two NP-1B battery packs simultaneously

Use a DC-520 battery adaptor. In this case the continuous operating time is about 120 minutes.

For more details, refer to the operation manual for the DC-520.

Note

When using two NP-1B battery packs simultaneously, always replace the two battery packs at the same time. If you replace one only, the newly replaced battery pack may be subjected to an excessive load, resulting in the internal circuit breaker tripping.

Power Sources

Using the BP-90A Battery Pack

Using an optional DC-500 battery case, you can operate the unit from a BP-90A battery pack.
Again, by using the battery pack as an internal power source, and an external battery (for example a BP-90A in a DC-210 battery adaptor) connected to the DC IN connector, you can use both battery packs together.

For more details, refer to the operation manual for the DC-500.

BP-90A battery pack operating time

This unit will operate (continuous recording) for about 150 minutes with a fully-charged BP-90A battery pack.

Using an AC Power Supply

You can use either a CMA-8A/8ACE camera adaptor or an AC-550/550CE AC adaptor (both supplied separately).

Notes

- When a power supply is connected to the DC IN connector, the unit always switches from the internal battery pack to use the external power source.
- When a power supply is connected to the DC IN connector, remove the internal battery pack if it is exhausted. If you connect a camera adaptor with an exhausted battery pack still in place, the camcorder may not operate when you turn the POWER switch on. In this case, turn the POWER switch off momentarily, then on again.

Before Recording

Viewfinder Adjustments

The following adjustments are provided to make the viewfinder image easier to see.

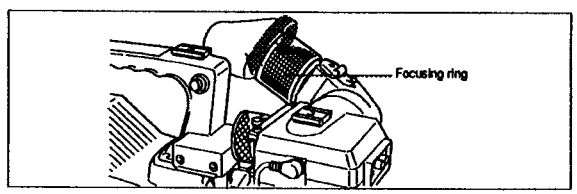
- Eyepiece focusing
- Contrast and brightness adjustments
- Edge enhancement of the viewfinder image

Note

You can use these adjustments to make the viewfinder image easier to work with. They do not affect the output video.

Adjusting the eyepiece focus

Turn the focusing ring until the viewfinder image is sharpest for your eyesight.



Adjusting the focus

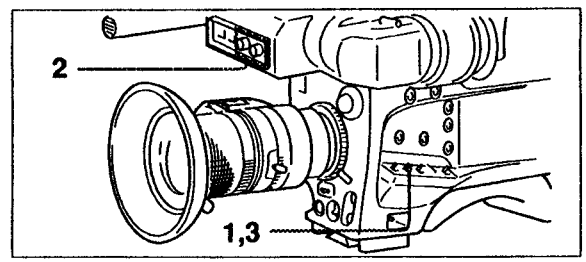
The adjustment range of the eyepiece is from –1 diopter[1] to –3 diopters.

1) **Diopter:** a unit of measurement of the refractive power of a lens.

Adjusting the viewfinder screen

Contrast and brightness adjustments

Use the color bar output to adjust the brightness and contrast of the viewfinder screen.



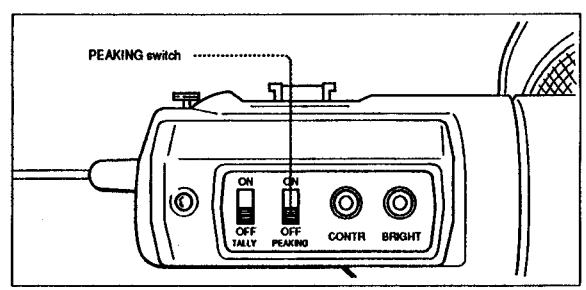
Adjusting the contrast and brightness

1 Set the OUTPUT switch to BARS.

2 While watching the image in the viewfinder, turn the CONTR control and BRIGHT control to adjust the contrast and brightness respectively.

3 Return the OUTPUT switch to CAM.

Edge enhancement of the viewfinder image

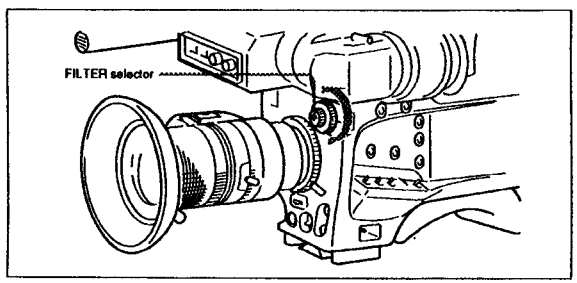


Edge enhancement

Set the viewfinder PEAKING switch to ON to enhance the edges of the viewfinder image, making lens focusing easier.

Color Temperature Filter Selection

The color temperature depends on the light source illuminating the subject. To get the correct lighting cast in the video, select the color temperature filter according to the lighting conditions.



Selecting the color temperature filter setting

FILTER selector settings

FILTER selector position	Color temperature and ND[a] filter	Lighting conditions
1	3200 K	Sunrise, sunset, studio lighting (with halogen lamps)
2	5600 K + 1/16 ND	Sunlight, and very bright conditions (snow and beach scenes)
3	5600 K	Cloudy or rainy conditions

a) ND filter: neutral density filter. A filter which does not change the color temperature.

When the filter is not correct for the lighting conditions

If the filter is not correct for the lighting conditions, the indication "LOW LIGHT" will appear on the viewfinder screen.

For details of the viewfinder warnings, see the section "Normal viewfinder display indications" (page 4-9).

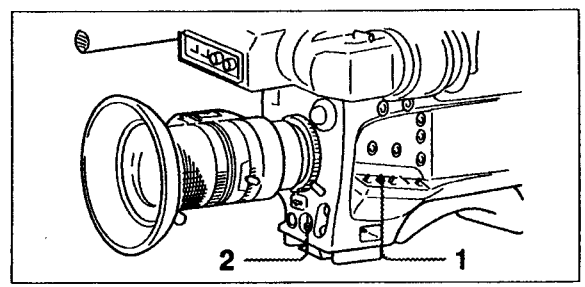
When a neutral density filter is required

When lighting conditions are so bright that they exceed the iris range, typically in bright sunlit beach and snow scenes, select FILTER setting 2, and then add a commercially available neutral density filter on the front of the camera. This will enable normal shooting.

Black Balance Adjustment

Adjust the black balance to obtain correct color rendering of dark image areas. Adjusting the black balance also simultaneously adjusts the black set, and the adjustment values are stored in memory. Even when the unit is powered off and on, and when lighting conditions change, it is not normally necessary to adjust the black balance. It is, however, necessary in the following cases.

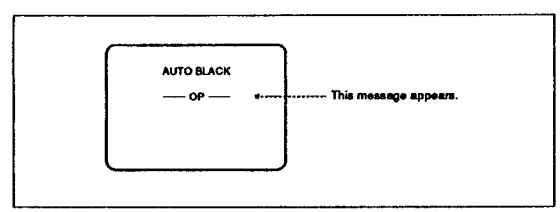
- If the message "MEMORY NG" appears in the viewfinder.
- When using the camcorder after a long time interval.
- If there is an extreme change in ambient temperature.



Black Balance Adjustment

1 Set the OUTPUT switch to CAM.

2 Push the white balance / black balance automatic adjustment switch to the BLK side.
The switch automatically returns to the center position when you take your finger away, and the iris automatically closes. During the adjustment the following viewfinder display appears.



Viewfinder display during black balance adjustment

The black balance adjustment takes a few seconds, then the viewfinder indication changes from "AUTO BLACK –OP–" to "AUTO BLACK –OK–". The adjustment settings are automatically stored in memory.

Note

The camera automatically shuts off the light during this adjustment, so if the iris adjustment is set to manual, you will need to open the iris manually after the adjustment is completed.

If the black balance adjustment is not possible

One of the indications shown in the following table appears in the viewfinder. Take the appropriate action, then repeat the adjustment.

Indications when the black balance adjustment is not possible

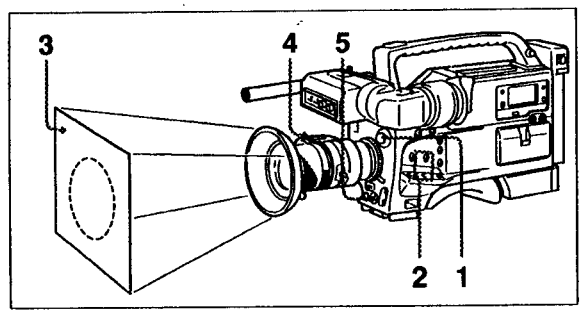
Indication	Problem
AUTO BLACK –NG– :IRIS NOT CLOSED TRY AGAIN	The iris did not close. Check that the lens cable is firmly connected and that there is no fault with the lens. If a retry still does not succeed, contact your local Sony service representative.
AUTO BLACK –NG– ?? TRY AGAIN	The iris opened during the adjustment, or there is a hardware error. If there appears to be a hardware error, contact your local Sony service representative.
BARS	The camera is outputting the color bar signal. Set the OUTPUT switch to CAM and repeat the operation.

White Balance Adjustment

Adjust the white balance according to the lighting conditions, to obtain correct color rendering.

The white balance adjustment values are stored in memory: two different settings can be stored, and are identified as A and B. These values are preserved when the unit is powered off.
Setting the W.BAL switch to A or B recalls the corresponding setting from memory. Thus it is possible to keep two settings immediately available for different lighting condition.

Use the following procedure to adjust the white balance.

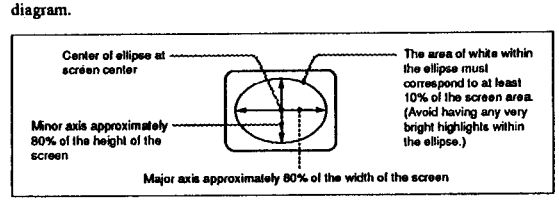


Adjusting the white balance

1 Select the FILTER setting to correspond to the illumination.

2 Set the OUTPUT, W.BAL, and ATW switches as follows.
OUTPUT: CAM
W.BAL: A or B
ATW: OFF

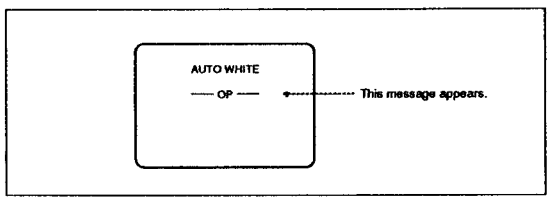
3 Place a white test card or cloth in the same lighting conditions as the subject to be shot, and zoom up so that the entire screen is white.
The minimum white area required for the adjustment is shown in the following diagram.


Center of ellipse at screen center
The area of white within the ellipse must correspond to at least 10% of the screen area. (Avoid having any very bright highlights within the ellipse.)
Minor axis approximately 80% of the height of the screen
Major axis approximately 80% of the width of the screen

Minimum white area required for adjustment

4 Switch the zoom lens IRIS selector to A (AUTO).

5 Push the white balance / black balance automatic adjustment switch to WHT. During the adjustment the following viewfinder display appears.



Viewfinder display during white balance adjustment

The white balance adjustment takes a few seconds, then the viewfinder indication changes from "AUTO WHITE –OP–" to "AUTO WHITE –OK–". The adjustment setting is automatically stored in memory A or B as selected in step **2**. These settings are preserved when the unit is powered off, and can be retained for up to approximately ten years.

If you wish to make a second white balance adjustment under different lighting conditions, repeat the process for the other memory.

If the white balance adjustment is not possible

One of the indications shown in the following table appears in the viewfinder. Take the appropriate action, then repeat the adjustment.

Indications when the white balance adjustment is not possible

Indication	Problem
AUTO WHITE –NG– :LOW LIGHT TRY AGAIN	The video level is too low. Increase the lighting level, or increase the video level by using the GAIN switch.
AUTO WHITE –NG– : ? ? TRY AGAIN	The image is not white. Point the camera at a white subject.
AUTO WHITE –NG– :C.TEMP.LOW CHG.FILTER TRY AGAIN	The color temperature is too low. Change the FILTER selector setting appropriately.
AUTO WHITE –NG– :C.TEMP.HI CHG.FILTER TRY AGAIN	The color temperature is too high. Change the FILTER selector setting appropriately.
:WHITE PRESET	The W.BAL switch is in the PRE position. Set the W.BAL switch to A or B.
BARS	The camera is outputting the color bar signal. Set the OUTPUT switch to CAM and repeat the operation.
AUTO WHITE –NG– :HIGH LIGHT TRY AGAIN	The white image in the camera field of view includes highlights. Substitute a subject of even intensity.

When there is no time for the adjustment

For hurried shooting, when there is no time for white balance adjustment, there are two techniques you can use.

- Using the ATW (Automatic Tracing White balance) function
- Using the preset values (for 3200 K and 5600 K)

Using the ATW function

When the ATW function is enabled, the unit automatically adjusts the white balance to follow any changes in lighting conditions during shooting.
To enable the ATW function, press the ATW button.

Disabling the ATW function

Press the ATW button once more.

If the ATW function cannot operate successfully

If the color temperature filter selected is not appropriate, and the adjustment range of the ATW function is exceeded, the ATW function provides the best setting possible, and displays a message in the viewfinder as shown in the following table. Take the appropriate action to correct the color temperature setting.

Indication	Problem
C.TEMP LOW	The color temperature is too low. Change the FILTER selector setting appropriately.
C.TEMP HI	The color temperature is too high. Change the FILTER selector setting appropriately.

Note

To ensure that the white balance is always correctly adjusted, it is recommended to carry out the adjustment by pressing the white balance / black balance automatic adjustment switch whenever the lighting conditions change.

Using the preset values

This unit has two preset values for white balance.
To use these preset values, check that the ATW function is disabled, and set the W. BAL switch to PRE. When the FILTER selector is in position 1, the white balance is adjusted to the preset value for 3200 K, and in other positions to the preset value for 5600 K.
This gives a generally adequate white balance, for instant shooting requirements.

Chapter 4
Basic Recording and Playback

This chapter describes basic procedures for shooting. It then describes indications which appear in the viewfinder and display window.

Cassettes 4-2
- Cassettes Used in This Unit 4-2
- Notes on Using Cassettes 4-2
- Inserting and Removing Cassettes 4-3

Basic Operations 4-4
- Shooting/Recording 4-4
- Recording Review Function 4-7

Indications in the Viewfinder and Display Window 4-8
- Indications in the Viewfinder 4-8
- Indications in the Display Window 4-17

Cassettes

Cassettes Used in This Unit

This unit uses S-size 1/2-inch Betacam SP metal tape cassettes. The type numbers of these tapes, with their recording times, are shown in the following table.

Cassettes used in this unit

Type	Recording time (minutes)
BCT-5MA	5
BCT-10MA/UVWT-10MA	10
BCT-20MA/UVWT-20MA	20
BCT-30MA/UVWT-30MA	30

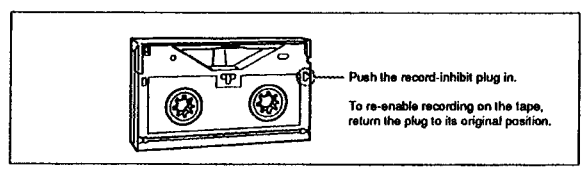
Note

If you insert an oxide tape such as a BCT-5G/10G/20G/30G tape, the unit ejects it automatically.

Notes on Using Cassettes

Preventing erasure

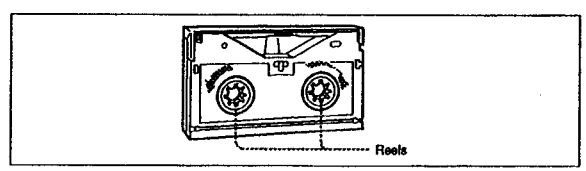
To protect recording on a tape, by preventing inadvertent erasure, do as follows.



Preventing erasure

Checking the tape for slack

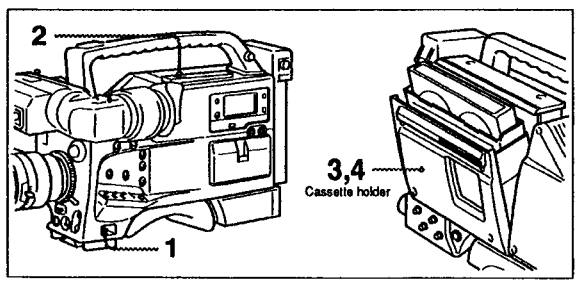
Push in the reels with a finger and turn gently in the directions shown by arrows. If the reels will not move, there is no slack.



Checking the tape for slack

Inserting and Removing Cassettes

Inserting a cassette



Inserting a cassette

1 Turn the POWER switch on.

2 Press the EJECT button to open the cassette holder.

You can press the EJECT button even when the cover is closed.

3 Check the points below, then insert the cassette with the window outward.
- The cassette must not have the record-inhibit plug pushed in.
- There must be no slack in the tape.

4 Close the cassette holder by pressing the point marked "PUSH" on the cassette holder.

Removing the cassette

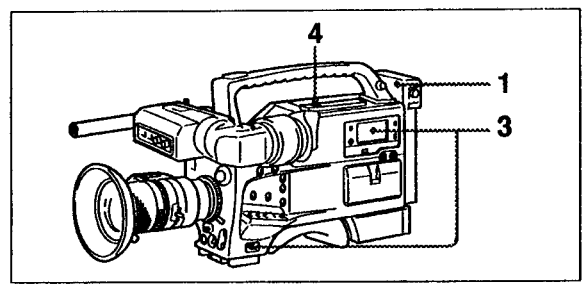
With the power supply on, press the EJECT button so that the cassette holder opens, then take out the cassette.
Then close the cassette holder. The panel at the top of the cassette holder then comes down.

Basic Operations

This section describes the basic operations for shooting. For best results, refer also to the various settings described in Chapter 5 "Adjustments."

Shooting/Recording

From powering on to loading a cassette



Powering on and loading a cassette

1 Load a fully charged battery pack.

2 Make the necessary connections to other equipment.

For details, see the section "Attaching Accessories" (page 3-5).

3 Turn the POWER switch on, and check that the HUMID indication has not appeared in the display window and that the BATT indication is not flashing.
- If the HUMID indication is showing, wait until it disappears.
- If the BATT indication is flashing, replace the battery pack with a fully charged one.

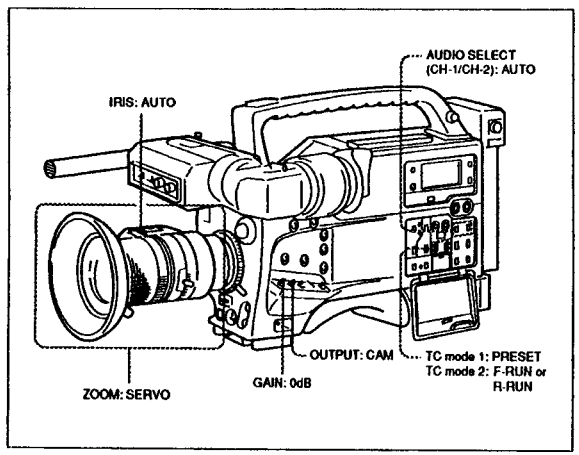
4 Press the EJECT button to open the cassette holder.

5 Load the cassette, after checking the points below, then close the cassette holder.
- The cassette is not set to inhibit recording.
- There is no slack in the tape.

From adjusting black balance and white balance to end of recording

Switch settings

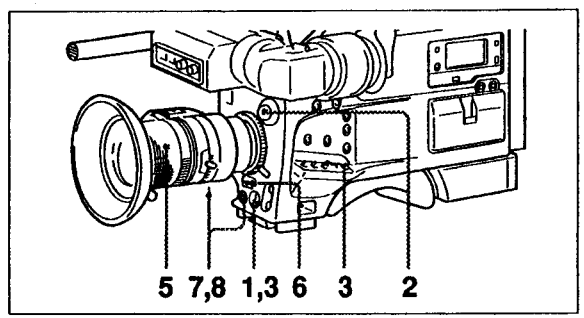
After turning the power supply on and loading a cassette, set the switches as below and begin operations.



Switch settings

Basic Operations

Shooting



Shooting

1 Adjust the black balance.

For details, see the section "Black Balance Adjustment" (page 3-26).

2 Adjust the FILTER selector setting according to the lighting conditions.

For details, see the section "Color Temperature Filter Selection" (page 3-25).

3 Adjust the white balance.

For details, see the section "White Balance Adjustment" (page 3-27).

4 Aim the camera at the subject, ensuring that it is at least 1 meter away.

5 Turning the focusing ring to adjust the focus, check the focus in the viewfinder or on a monitor.

6 If necessary, select the appropriate shutter speed.

For details, see the section "Setting the Shutter Speed" (page 5-5).

7 Press the VTR button on the camera body or the lens, to start recording.

8 To pause recording, press the VTR button once more.
The REC indicator will go off, and the unit will be in the "standby on"[1] mode.
To stop recording completely[2] after pausing, press the STOP button.

1) **"Standby on":** This term means that the recorder is on standby, with the drum rotating and the tape held in tension by the pressure of the capstan and pinch rollers. In this state, recording starts within about 0.3 seconds of pressing the VTR button.

2) The state after the STOP button is pressed is also referred to as "standby off" mode. In this state, although the tape is wound round the drum, the drum is stationary and the capstan and pinch roller pressure is not applied. It takes about 3 seconds to start recording after the VTR button is pressed.

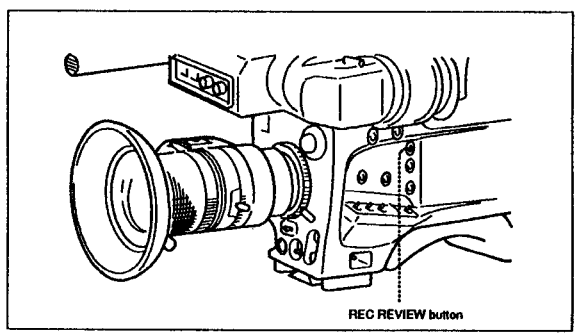
Notes

- During recording, the tape control buttons (EJECT, REW, F FWD, PLAY, STOP, REC REVIEW) have no effect.
- If you leave the unit in the paused state ("standby on") for eight minutes (you can change the period), then to protect the tape, the unit automatically releases the tape tension ("standby off" mode).

To change the maximum period that the unit will stay in the paused state, see the section "Using the VTR Menu" (page 5-20).

Recording Review Function

The recording review function enables you to check the last few seconds of recording in the viewfinder.



Recording review function

With recording paused, press the REC REVIEW button on the camera body. Depending on how long you hold down the REC REVIEW button, the unit automatically rewinds the tape for between two and ten seconds before the pause, and plays back this section in the viewfinder, also outputting the sound to the earphone or speaker. After the playback, the unit returns to the paused state.

Note

If during recording review you press the VTR button or the trigger switch on an RM-81, the recording review function is abandoned, and recording starts. In this case it is not possible to make the recording continuous from the previous recording.

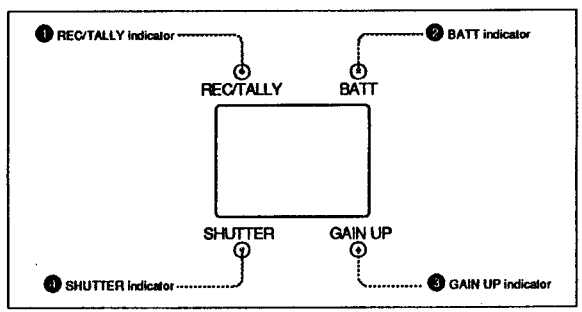
Indications in the Viewfinder and Display Window

This section describes the messages and indications that appear in the viewfinder or in the display window.

Indications in the Viewfinder

Point indicators in the viewfinder display

There are four point indicators in the viewfinder around the periphery of the screen. These flash or light continuously to indicate particular statuses of the unit.



Point indicators in the viewfinder display

1 REC/TALLY indicator (red)
This lights when the built-in VTR or a VTR connected to the EXT VTR connector is recording. It flashes when there is a fault.

2 BATT indicator (red)
This flashes when the battery pack in this unit or in a VTR connected to the EXT VTR connector is almost exhausted. It lights continuously immediately before the battery pack is completely exhausted.

3 GAIN UP indicator (orange)
This lights when the GAIN switch is in the MID or HIGH position, or when the gain has been increased automatically by the AGC function.

4 SHUTTER indicator (red)
This lights when the SHUTTER switch is in the ON position, or when the AE function has been enabled and the electronic shutter is operating.

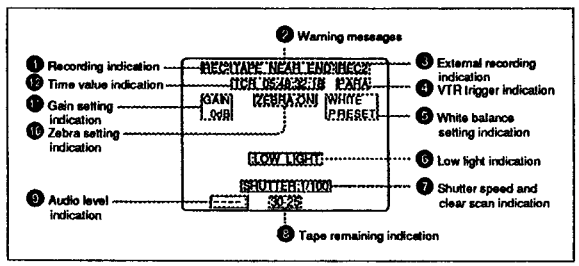
For details of the AE function, see the section "Automatic Exposure Function" (page 5-8).

Normal viewfinder display indications

The following indications appear in the viewfinder display.

Note

The viewfinder indications (other than menus) do not appear during playback, rewind, fast forward and recording review operation.



Normal viewfinder display indications

Selecting the display indications

You can use a menu operation to select whether or not and in some cases how to display some of the above indications, as shown in the following table.

Selecting the display indications

Display indication	Selection	See page
❻ Low light indication	Display or not display	5-18
❼ Shutter speed and clear scan indication	Display continuously or for two seconds	5-5
❽ Tape remaining indication	Display or not display	5-18
❾ Audio level indication	Display or not display, and which channel to display	5-15
⓫⓬ Time value indication	Display or not display	5-18

Indications in the Viewfinder and Display Window

Enabling and disabling display indications with the DOWN/OFF and UP/ON buttons

Regardless of the settings of the menu selections described above, it is possible to turn off some of the normal viewfinder indications by pressing the DOWN/OFF button. To restore the indications, press the UP/ON button.

This function applies to the following indications together; it is not possible using this method to turn individual indications on or off.

- ❶ Recording indication
- ❺ External recording indication
- ❽ Tape remaining indication
- ❾ Audio level indication
- ⓬ Time value indication

However, when an external VTR connected to the EXT VTR connector is powered on, it is not possible to disable ❶ recording indication and ❺ external recording indication.

Interpretation of the indications

The interpretation of the indications is as follows.

❶ Recording indication

This indicates that the built-in VTR is recording.

❷ Warning messages

The warning messages listed in the following table appear as appropriate.

Warning messages

Message	Meaning
NO TAPE	There is no cassette inserted.
REC INHIBIT	The cassette has the record-inhibit plug pushed in.
LOW BATT.	The battery is low.
BATT.END	The battery is exhausted.
TAPE NEAR END	The tape is near the end.
TAPE END	The tape is at the end.
CHECK REMOTE	A device other than a remote control unit (a headphone for example) appears to be connected to the REMOTE connector.
SERVO	Servo lock is lost.
HUMID	There is condensation on the drum.
RF	The video heads are clogged, or there is a fault in the recording system.
SLACK	The tape cannot be wound properly.
OXIDE TAPE	The cassette inserted is an oxide tape cassette. (The cassette is automatically ejected.)

❺ External recording indication

This indicates that the VTR connected to the EXT VTR connector is recording. It flashes if there is a fault on the external VTR.

❹ VTR trigger indication

When an external VTR is connected to the EXT VTR connector, when you change the setting of the VTR TRIGGER switch, the indication of the new setting appears for two seconds. This indication also appears when the unit is powered on (for five seconds) and while the DISP CHG switch is held up with the viewfinder in normal display mode.

VTR TRIGGER switch settings and VTR trigger indications

VTR TRIGGER switch setting	VTR trigger indication
PARALLEL	PARA
INT ONLY	INT
EXT ONLY	EXT

❺ White balance setting indication

The white balance setting indication appears in the following cases:

- When you use the W.BAL switch to carry out automatic white balance adjustment, and when you enable the ATW (Auto Tracing White balance) function with the ATW button (for about two seconds).
- When you power on the unit (for about five seconds).
- In the normal display, while the DISP CHG switch is held up.

The indication reflects the W.BAL switch and ATW button settings as shown in the following table.

W.BAL switch and ATW button settings and white balance indication

Settings	Indication
W.BAL switch in A position	WHITE AUTO/A
W.BAL switch in B position	WHITE AUTO/B
W.BAL switch in PRE position	WHITE PRESET
When ATW button is on and ATW function is operating	ATW ON

❻ Low light indication

When the lighting is inadequate, the "LOW LIGHT" indication appears. Depending on the conditions, make one of the following adjustments.

- Make the lighting brighter.
- Open the iris manually, or use the auto iris function.
- Select the correct filter.
- Increase the gain.

❼ Shutter speed and clear scan indication

This indicates the following.

- The shutter speed value
- The clear scan frequency setting

You can use a menu setting to select whether this indication should be displayed continuously or for two seconds only after powering on or changing the setting. In any event, it is always displayed in the normal display while the DISP CHG switch is held up.

For details of the shutter speed setting and clear scan function, see the section "Shutter Speed" (page 5-5).

❽ Tape remaining indication

This shows the amount of tape remaining as shown in the following table.

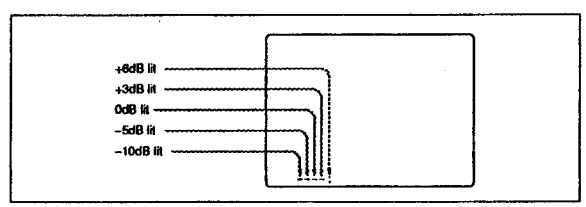
Tape remaining indication

Tape remaining	Tape remaining indication
35 to 30 minutes	35-30[a]
30 to 25 minutes	30-25
25 to 20 minutes	25-20
20 to 15 minutes	20-15
15 to 10 minutes	15-10
10 to 5 minutes	10-5
5 to 0 minutes	5-0
2 to 0 minutes	5-0 (flashing)

a) UVW-100PK/100PL only

❾ Audio level indication

This shows the audio level for the channel (1, or 2) selected in the menu.



Audio level indication

❿ Zebra setting indication

The indication of the setting of the ZEBRA button (ON or OFF) appears in the following cases:

- When you change the setting of the ZEBRA button (for about two seconds).
- When you power on the unit (for about five seconds).
- In the normal display, while the DISP CHG switch is held up.

⑪ Gain setting indication

The video gain setting indication appears in the following cases:

- When you use the GAIN switch is used to change the gain setting or when the AGC button is set to ON (for about two seconds).
- When you power on the unit (for about five seconds).
- In the normal display, while the DISP CHG switch is held up.

The indication reflects the GAIN switch and AGC button settings as shown in the following table.

GAIN switch and AGC button settings and gain setting indication

Settings	Indication
GAIN switch in 0dB position	GAIN 0dB
GAIN switch in MID position	GAIN xdB (where x is MID setting; default 9 dB)
GAIN switch in HIGH position	GAIN xdB (where x is HIGH setting; default 18 dB)
When AGC button is on and AGC function is operating	AGC ON LIMIT z dB (where z is upper limit to gain)

For details of the gain settings, see the section "Video Gain Adjustment" (page 5-3).

⑪ Time value indication

This shows the value for the built-in VTR, selected by the DISPLAY switch as shown in the following table.

DISPLAY switch setting and time value displayed

DISPLAY switch setting	Time value displayed
CTL	CTL: tape running time calculated by counting pulses of the CTL (control) signal
TC	TC: time code value from the time code generator
U-BIT	U-BIT: user bit value from the user bit generator

Note

During black balance and white balance adjustment or during playback, fast forward, rewinding and recording review the time value is not shown.

Indications in the Viewfinder and Display Window

Viewfinder menu display

It is possible to display some of the settings of the unit which do not appear on the normal viewfinder display in a series of menu screens.

For details of the settings, you can change, see the page numbers listed in the table on page 4-16.

Displaying the menu screens

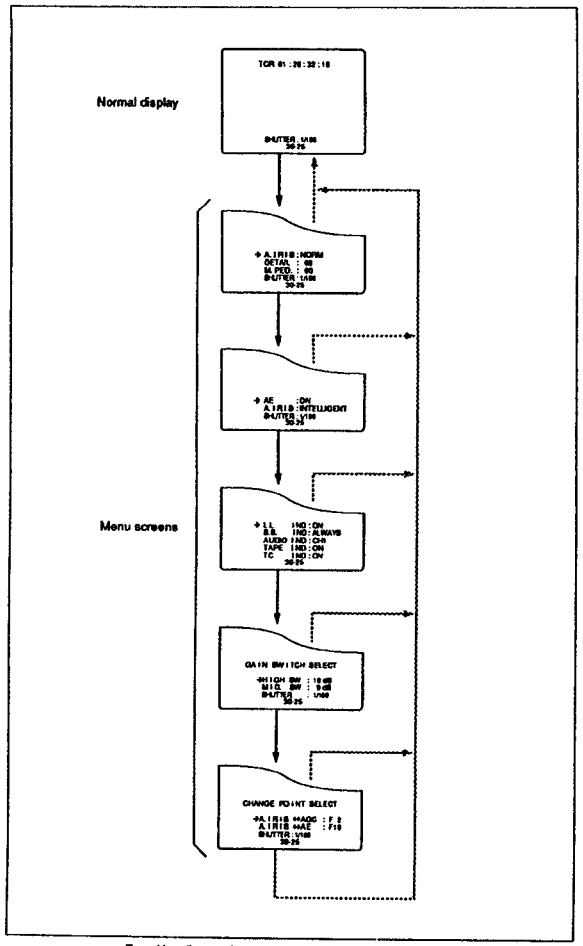
When the normal display is present, press the DISP CHG switch down.
This displays the first of the total of five menu screens.

Displaying the next menu screen

Press the DISP CHG switch down repeatedly until the cursor is on the lowest item, then press the DISP CHG switch once more.
This switches to the next menu screen.

Returning from the menu screens to the normal display

On the menu screen, press the DISP CHG switch up repeatedly until the cursor is on the top item, then press the DISP CHG switch once more.
This returns from the menu screens to the normal display



Transition diagram for the normal display and menu screens

Indications in the Viewfinder and Display Window

Items shown on the menu screens

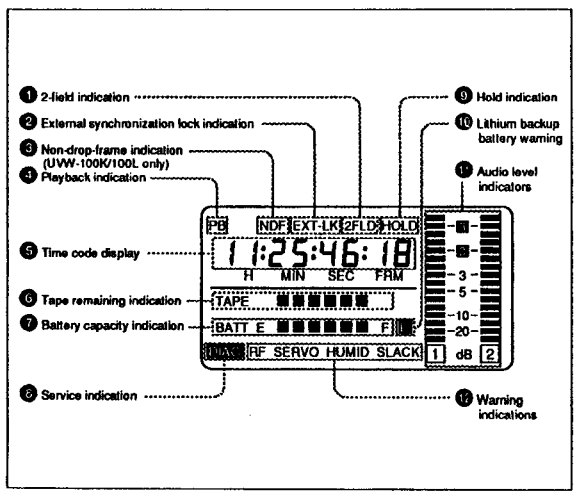
The items shown on the menu screens and their meanings are shown in the following table.

Items shown on the menu screens

Indication	Meaning	Settings	See page
A. IRIS	Reference value for auto iris	–1.0, –0.5, NORM, 0.5, or 1.0	5-2
DETAIL	Detail level	–99 to +99	5-14
M. PED	Master pedestal level	–99 to +99	5-13
SHUTTER (CLS)	Shutter speed or clear scan frequency	Shutter speed: 1/60 (UVW-100PK/100PL), 1/100 (UVW-100K/100L), 1/250, 1/500, 1/1000, or 1/2000 Clear scan frequency: 59.9 to 200.3 Hz (UVW-100K/100L)/50.0 Hz to 201.5 Hz (UVW-100PK/100PL)	5-5
AE	Automatic exposure function	ON or OFF	5-8
A. IRIS	Intelligent auto iris function (backlight correction)	INTELLIGENT or NORMAL	5-12
L. L. IND	Low light indication	ON or OFF	5-18
S. S. IND	Shutter speed indication	ALWAYS or 2 SEC	5-6
AUDIO IND	Audio level indication and channel selection	OFF, CH-1 or CH-2	5-15
TAPE IND	Tape remaining indication	ON or OFF	5-18
TC IND	Time code indication	ON or OFF	5-18
HIGH SW	GAIN selector HIGH setting	2dB to 18dB	5-3
MID. SW	GAIN selector MID setting	1dB to 17dB	5-3
A. IRIS ↔ AGC	Aperture for switching between AGC and auto iris.	F1.4, F2, F2.8, or F5.6	5-9
A. IRIS ↔ AE	Aperture for switching between AE function and auto iris.	F16, F11, F8, F5.6 or F4	5-10

Indications in the Display Window

The following indications appear in the display window.



Indications in the Display Window

1 2-field indication

This appears when the internal time code generator has color frame locking disabled.

2 External synchronization lock indication

This appears when the internal time code generator is locked to an external signal input to the TC IN connector.

3 Non-drop-frame indication (for UVW-100K/100L only)

This appears when non-drop-frame mode is selected.

4 Playback indication

This appears during playback with the time code display showing a time code or user-bit value.

5 Time code display

Depending on the setting of the DISPLAY switch, this shows a counter value, time code value or user-bit value.

For details, see the section "Normal viewfinder display indications" (page 4-9).

6 Tape remaining indication

This shows the remaining tape time as shown in the following table.

Tape remaining indication

Indication	Tape time remaining
TAPE ■■■■■■	25 minutes or more
TAPE ■■■■■	20 to 25 minutes
TAPE ■■■■	15 to 20 minutes
TAPE ■■■	10 to 15 minutes
TAPE ■■	5 to 10 minutes
TAPE ■	2 to 5 minutes
TAPE ■ (flashing)	0 to 2 minutes
TAPE (flashing)	End of tape
No indication	No cassette loaded

7 Battery capacity indication

This shows the battery capacity as shown in the following table.

Battery capacity indication

Indication	Battery voltage
BATT E ■■■■■■ F	12.5 V or more
BATT E ■■■■■ F	12.0 V to 12.5 V
BATT E ■■■■ F	11.75 V to 12.0 V
BATT E ■■■ F	11.5 V to 11.75 V
BATT E ■■ F	11.3 V to 11.5 V
BATT E ■■ F (flashing) a)	11.25 V to 11.3 V
BATT E ■ F (flashing)	11.0 V to 11.25 V
BATT E F (flashing)	11.0 V or less

a) Replace the battery pack when this indication appears.

8 Service indication

This appears during maintenance and special setting operations. It does not appear during normal operation.

⑨ Hold indication
This appears when the internal time code generator is stopped.

⑩ Lithium backup battery warning
This appears when the voltage of the internal lithium backup battery is low. If this indication appears, replace the lithium backup battery immediately.

For how to replace the lithium backup battery, see the section "Replacing the Lithium Battery" (page 5-19).

⑪ Audio level indicators
These show the audio recording or playback levels. There are two indications, for channels 1 and 2 respectively.
When using the AUDIO LEVEL (CH-1/CH-2) knobs to adjust the audio levels manually, adjust so that the the indications are 0 dB at the maximum sound level.

⑫ Warning indications
These comprise the following indications.
RF: The video heads are clogged, or there is a fault in the recording system.
SERVO: Servo lock is lost.
HUMID: There is condensation on the drum.
SLACK: The tape cannot be wound properly.

Chapter 5
Adjustments

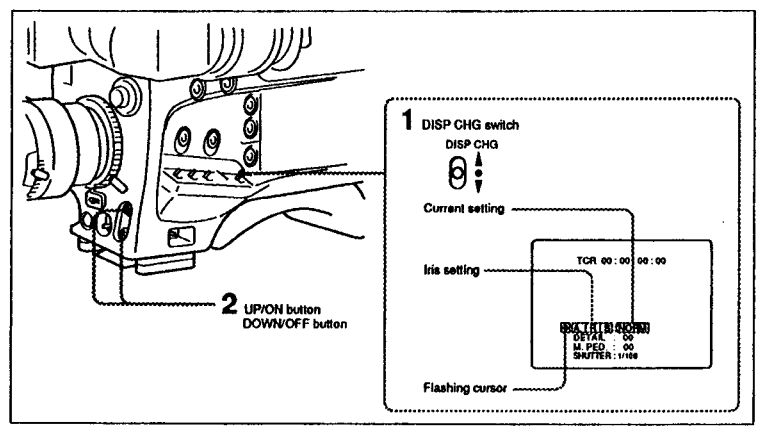
This chapter describes various adjustments and settings which are necessary for high quality recording.

Changing the Reference Value for Automatic Iris Adjustment 5-2
Video Gain Adjustment 5-3
Automatic Gain Control 5-4
Shutter Speed 5-5
Setting the Shutter Speed 5-5
Clear Scan Function 5-7
Automatic Exposure Function 5-8
Automatic Exposure Control Using the AGC and AE Functions 5-8
Using the Auto Iris Function 5-9
Using the Manual Iris Adjustment 5-11
Backlight Correction — Intelligent Auto Iris Function 5-12
Pedestal Level 5-13
Detail Level 5-14
Audio Levels 5-15
Adjusting the Flangeback Distance 5-17
Selecting the Low Light, Tape Remaining and Time Value Indications 5-18
Replacing the Lithium Battery 5-19
Using the VTR Menu 5-20

Changing the Reference Value for Automatic Iris Adjustment

When you wish to obtain special effects, such as a lighter effect when shooting against backlighting, you can change the reference value for automatic iris adjustment. From the standard value, you can make any of the following adjustments. The setting is preserved when the unit is powered off.

- –1.0 (iris closed by about one f-stop)
- –0.5 (iris closed by about half an f-stop)
- NORM (standard reference position)
- 0.5 (iris opened by about half an f-stop)
- 1.0 (iris opened by about one f-stop)



Changing the reference value for automatic iris adjustment

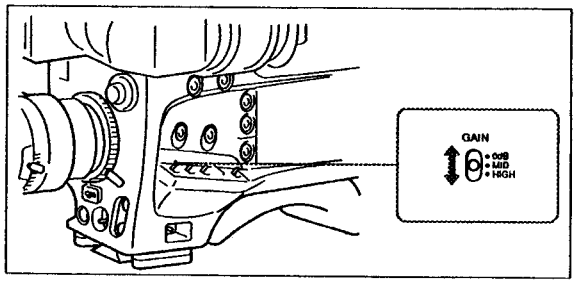
1 Press the DISP CHG switch down repeatedly until the menu screen shown in the figure appears on the viewfinder screen.

2 Set the value as shown in the following table.

Setting change	Operation
To increase the setting	Press the UP/ON button.
To decrease the setting	Press the DOWN/OFF button.
To return to the standard setting	Press the UP/ON button and DOWN/OFF button simultaneously.

Video Gain Adjustment

When the lighting conditions are poor, and the video image is too dark, it is possible to increase the video gain by changing the setting of the GAIN switch.



GAIN switch

The GAIN switch changes the video gain setting as follows.
0dB: normal gain
MID: setting for MID gain position (default 9 dB)
HIGH: setting for HIGH gain position (default 18 dB)

For details of how to set the MID and HIGH values, see the next section "Gain settings".

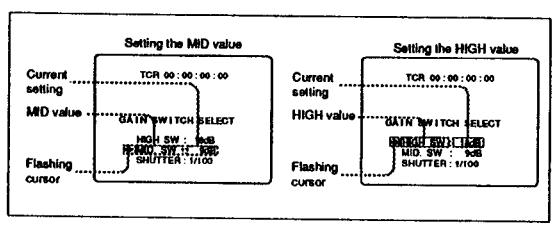
Gain settings

You can set both the MID and HIGH gain settings to values from 0 dB to 18 dB in 1 dB steps.

Note

It is not possible to set the MID value to more than the HIGH value.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



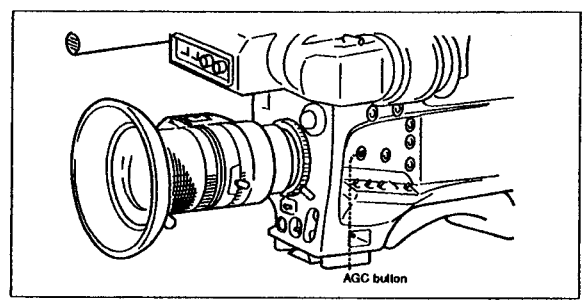
(Continued)

2 Set the value as shown in the following table.

Setting change	Operation
To increase the setting	Press the UP/ON button.
To decrease the setting	Press the DOWN/OFF button.
To return to the default setting (MID: 9 dB, HIGH: 18 dB)	Press the UP/ON button and DOWN/OFF button simultaneously.

Automatic Gain Control

Using the Automatic Gain Control (AGC) function, you can have the unit automatically adjust the gain when lighting conditions are poor. Unlike manual gain adjustment, this provides a continuous adjustment, and therefore provides a more natural effect as lighting conditions change.



To use AGC function

To use the AGC function, press the AGC button, turning the AGC indicator on. The range over which the AGC function adjusts the range is determined by the setting of the GAIN switch as shown in the following table.

Gain adjustment range

GAIN switch setting	Automatic gain adjustment range
0dB	0 dB
MID	From 0 dB to the MID setting (default 9 dB)
HIGH	From 0 dB to the HIGH setting (default 18 dB)

When you are using the AGC function and the gain has been raised, the viewfinder GAIN UP indicator lights.
To switch the AGC function off, press the AGC button again.

Notes

- When the gain is raised, the picture quality is slightly degraded.
- To shoot a dark location so that it appears dark, do not use the AGC function.

Shutter Speed

This section describes the following operations:
- How to set the shutter speed
- How to use the clear scan function to reduce dark bands when shooting a computer screen
- Automatic exposure control in over-bright lighting conditions

Setting the Shutter Speed

You can select the shutter speed from five values, according to the lighting conditions.
NTSC: 1/100 (factory default), 1/250, 1/500, 1/1000, 1/2000 seconds
PAL: 1/60 (factory default), 1/250, 1/500, 1/1000, 1/2000 seconds
The setting is saved in memory and preserved when the unit is powered off.

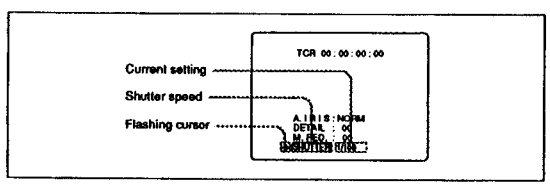
Notes on setting the shutter speed

- To avoid flicker when shooting under fluorescent or mercury discharge lighting, set the shutter speed to 1/100 (or 1/60) second.
- When the AE function is enabled, it is not possible to select the shutter speed. Turn the AE function off before setting the shutter speed.

For details of the AE function, see the section "Automatic Exposure Function" (page 5-8).

- If you use faster shutter speeds under fluorescent or mercury discharge lighting, as the shutter speed becomes faster there will be an increase of flicker and color distortion. In these cases, set the shutter speed to 1/100 (or 1/60) second.
- When using faster shutter speeds, the smear phenomenon may become more pronounced.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



2 Set the SHUTTER switch to ON.
The shutter speed indication in the viewfinder display changes from "OFF" to the current setting.

(Continued)

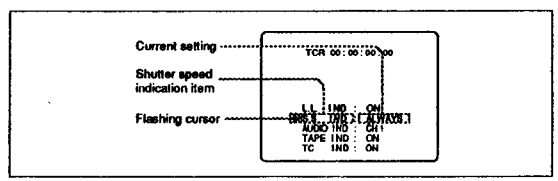
3 Use the UP/ON and DOWN/OFF buttons to set the shutter speed.

Setting change	Operation
To increase the setting	Press the UP/ON button.
To decrease the setting	Press the DOWN/OFF button.
To return to the default setting (1/100 (NTSC) or 1/60 (PAL))	Press the UP/ON button and DOWN/OFF button simultaneously.

Selecting the shutter speed display time

You can select whether to have the shutter speed displayed constantly in the viewfinder, or only when you change the setting.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



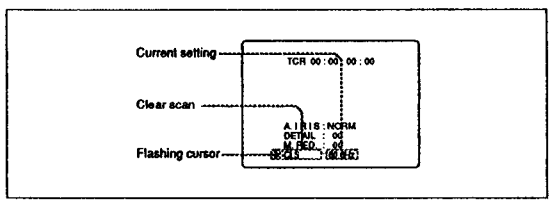
2 Use the UP/ON and DOWN/OFF buttons to select the shutter speed indication.

Selection required	Operation
Constant display	Set to "ALWAYS".
Display for 2 seconds only after change or power on	Set to "2 <SEC>".

Clear Scan Function

When shooting a computer monitor screen (or projection image), you can use the clear scan function to reduce the moving dark bands which otherwise appear across the screen.
You can set the frequency for the clear scan function to any frequency in the following range, to correspond to the scan frequency of the monitor:
NTSC: 59.9 Hz to 200.3 Hz.
PAL: 50.0 Hz to 201.5 Hz
The setting is saved in memory and preserved when the unit is powered off.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



If instead of the clear scan setting (CLS: xx.xHz) there is a shutter speed indication (SHUTTER: 1/xxx), press the UP/ON button repeatedly until the clear scan setting appears.

2 Use the UP/ON and DOWN/OFF buttons to set the clear scan frequency.

Setting change	Operation
To increase the frequency	Press the UP/ON button.
To decrease the frequency	Press the DOWN/OFF button.
To return to the default shutter speed setting (1/100 (NTSC) or 1/60 (PAL))	Press the UP/ON button and DOWN/OFF button simultaneously.

Note on scan frequency values

The vertical scan frequency will depend on the type of computer, and also the type of monitor or software running. It may not always be possible to eliminate all of the banding effect.
- Apple Macintosh II [1] series: Scan frequency 66.7 Hz
- IBM PS/2 series [2]: Scan frequency 70.1 Hz (720 × 400 screen mode)
- NEC PC9801XL: Scan frequency 80.0 Hz

1) Macintosh is a registered trademark of Apple Computer Corporation.
2) PS/2 is a registered trademark of IBM Corporation.

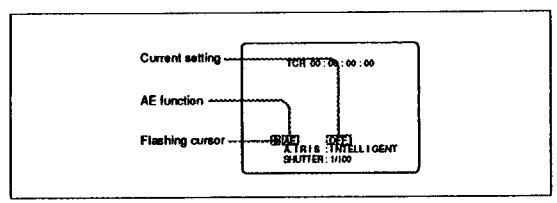
Automatic Exposure Function

The automatic exposure (AE) function uses the electronic shutter of the CCD imager to adjust the exposure automatically when the lighting conditions are too bright. Using this function the shutter speed can be set to any value from 1/60 second (NTSC) or 1/50 second (PAL) to 1/250 second, in steps of approximately 1/15000 second.
When the AE function is operating the electronic shutter, the SHUTTER indicator in the viewfinder lights.

Note on the AE function

The AE function is recommended for use in natural lighting conditions. Under fluorescent or mercury discharge lighting, it may lead to flicker.

1 Press the DISP CHG switch down repeatedly until the menu screen shown in the figure appears on the viewfinder screen.



2 Press the UP/ON button to enable the AE function.

Disabling the AE function
To turn the AE function off, press the DOWN/OFF button.

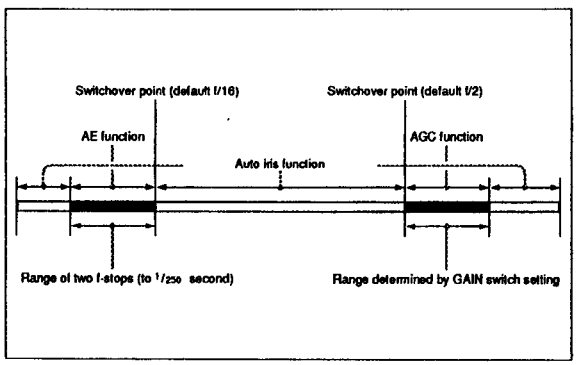
Automatic Exposure Control Using the AGC and AE Functions

With a conventional video camera, in addition to adjusting the iris, it is normally possible to increase the video gain or add neutral density filters according to the lighting conditions. In addition to these functions, this unit allows you to use the following automatic adjustments.
- The AGC function when the lighting level is too low
- The AE function when the lighting level is too high

By combining the AGC and AE functions, you can obtain even easier shooting conditions.
This section describes the settings for combining the AGC and AE functions.

Using the Auto Iris Function

When using the auto iris function together with the AGC and AE functions, you can effectively add the adjustment ranges of the three functions, as shown in the following figure.


Switchover point (default f/16)
Switchover point (default f/2)
AE function
AGC function
Auto iris function
Range of two f-stops (to 1/250 second)
Range determined by GAIN switch setting

Automatic exposure control using the AGC and AE functions

It is possible to change the f-stops at which the switchovers to the AGC and AE functions occur.

For details, see the section "Setting the f-stop to switch between auto iris and the AGC function" below and "Setting the f-stop to switch between auto iris and the AE function" (page 5-10).

Setting the f-stop to switch between auto iris and the AGC function

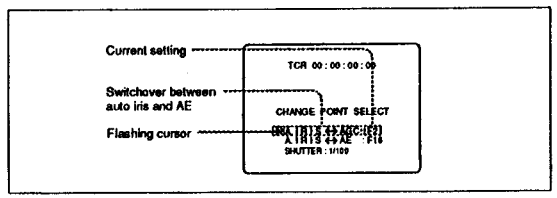
Select the f-stop from the following five values: f/1.4, f/2, f/2.8, f/4 and f/5.6.

Note

If you set the switchover point to f/1.4, and use the motorized zoom to zoom completely to telephoto, colored effects may appear at the top and bottom edges of the picture.

Automatic Exposure Control Using the AGC and AE Functions

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



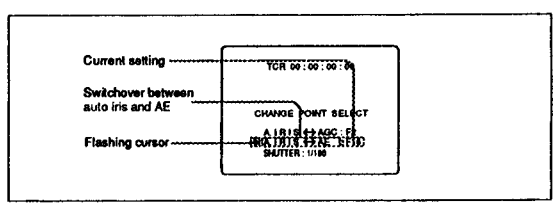
2 Use the UP/ON and DOWN/OFF buttons to change the f-stop.

Setting change	Operation
To increase the f-stop	Press the UP/ON button.
To decrease the f-stop	Press the DOWN/OFF button.
To return to the default setting (f/2)	Press the UP/ON button and DOWN/OFF button simultaneously.

Setting the f-stop to switch between auto iris and the AE function

Select the f-stop from the following five values: f/16, f/11, f/8, f/5.6 and f/4.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.

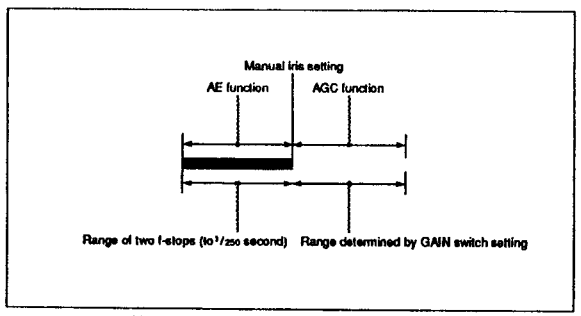


2 Use the UP/ON and DOWN/OFF buttons to change the f-stop.

Setting change	Operation
To increase the f-stop	Press the UP/ON button.
To decrease the f-stop	Press the DOWN/OFF button.
To return to the default setting (f/16)	Press the UP/ON button and DOWN/OFF button simultaneously.

Using the Manual Iris Adjustment

When using manual iris adjustment together with the AGC and AE functions, the exposure adjustment is carried out as shown in the following figure.


Manual iris setting
AE function
AGC function
Range of two f-stops (to 1/250 second)
Range determined by GAIN switch setting

Manual exposure control using the AGC and AE functions

Depth of field

The depth of field is the distance in front and behind a subject for which the image is still in focus.

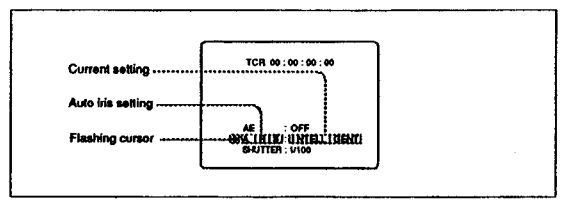
Iris adjustment and depth of field
Closing the iris progressively increases the depth of field. Equally, opening the iris decreases the depth of field, and you can use this to accentuate foreground objects by making the background out of focus.

Depth of field and the AGC and AE functions
The iris controls the aperture of the lens, and thus the amount of light admitted, and at the same time affects the depth of field. With a conventional camera, changing the depth of field inevitably changes the overall exposure, but now using the AGC and AE functions, you can simply change the depth of field, and the exposure is automatically maintained constant.

Backlight Correction — Intelligent Auto Iris Function

The auto iris function on this unit has two modes of operation: normal and intelligent. In the intelligent mode the intelligent auto iris function operates, allowing you to shoot a backlit subject with an appropriate exposure. When the background is very bright, as when backlit, the lens aperture is opened somewhat more than normal, and when the foreground is very bright the lens aperture is reduced compared with the normal setting.
The factory default setting is to enable the intelligent auto iris function, but you can change this as follows.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



2 Use the UP/ON and DOWN/OFF buttons to select the setting.

Selection required	Operation
Intelligent auto iris function operating	Set to "INTELLIGENT".
Intelligent auto iris function not operating	Set to "NORMAL".

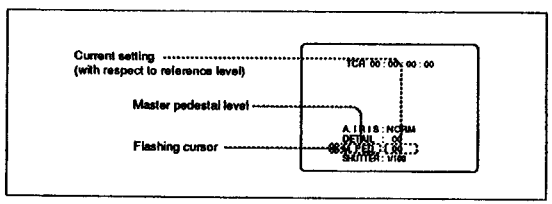
Note

The intelligent auto iris function may not be effective in some cases, depending on the position and size of the subject. To get maximum effect from this function, make the subject occupy at least one-third of the screen area in the center.

Pedestal Level

To set the contrast, for outdoor shooting for example, adjust the master pedestal level, the video reference level.
Increasing the level makes the image of a dark location brighter, and decreasing the level makes the image darker. You can adjust the value between –30% and +30% from the reference level (0.35 V) in steps of approximately 0.3%.
The setting is saved in memory and preserved when the unit is powered off.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



2 Use the UP/ON and DOWN/OFF buttons to change the master pedestal level.

Setting change	Operation
To increase the level	Press the UP/ON button.
To decrease the level	Press the DOWN/OFF button.
To return to the reference level (00)	Press the UP/ON button and DOWN/OFF button simultaneously.

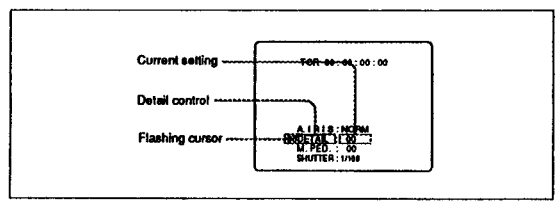
Detail Level

By changing the setting of the detail level, you can control the degree of emphasis given to outlines in the image. Increasing the emphasis gives the image a certain quality of sharpness, whereas decreasing it imparts a softer aura. You can adjust the detail level between –99 and +99. The factory default setting is 00.

Note

If you increase the detail level at the MID or HIGH gain setting, the image will be made sharper, but noise is likely to occur.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



2 Use the UP/ON and DOWN/OFF buttons to change the detail level.

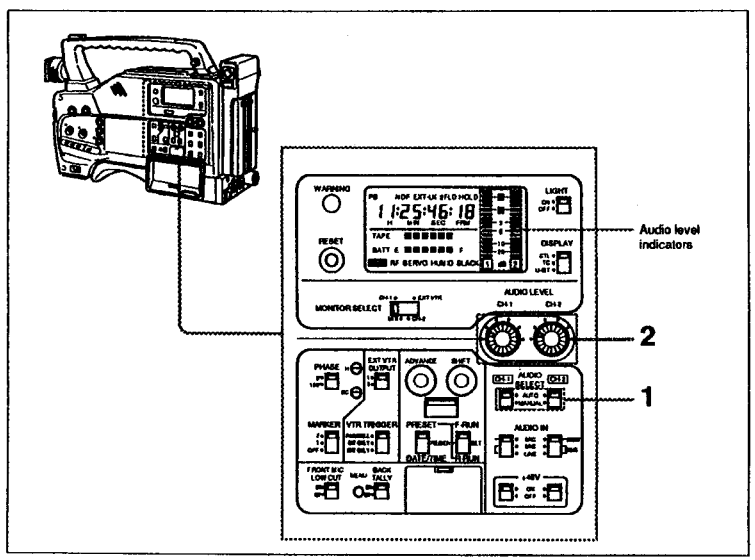
Setting change	Operation
To increase the level	Press the UP/ON button.
To decrease the level	Press the DOWN/OFF button.
To return to the reference level (00)	Press the UP/ON button and DOWN/OFF button simultaneously.

Audio Levels

This section describes the following adjustments.
- Manual audio recording level adjustment
- Selecting the audio level indication in the viewfinder

Manual audio recording level adjustment

If the AUDIO SELECT (CH-1/CH-2) switches are in the AUTO position, the audio recording levels are controlled automatically. To control the audio levels manually, carry out the following procedure.
Do this after selecting the input signals for each of the audio channels using the AUDIO IN (CH-1/CH-2) switches.



Adjusting the audio recording levels

Audio Levels

1 Set the AUDIO SELECT switch for the channel or channels you wish to adjust manually to MAN.

2 Watching the audio level indicators in the display window, turn the AUDIO LEVEL knob or knobs for the channel or channels you wish to adjust.

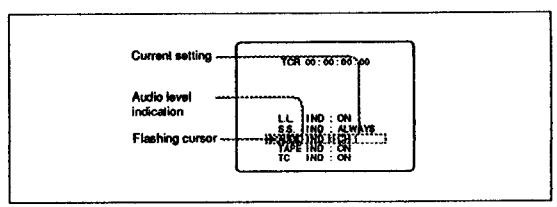
Note

Ensure that the maximum audio level does not exceed 0 dB.

Selecting the audio level indication

The audio levels for both channels are always shown in the display window, both for playback and recording, but you can also have an audio level indication for a selected channel in the viewfinder.
To select whether to have an audio level indication in the viewfinder, and if so which channel to indicate, carry out the following procedure.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



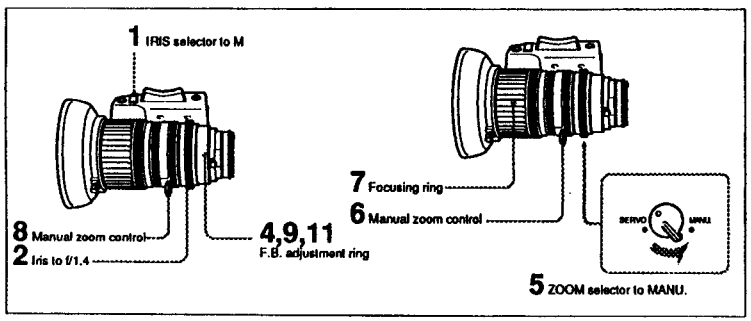
2 Use the UP/ON and DOWN/OFF buttons to select the audio level indication.

Selection required	Operation
No level indication	Set to "OFF".
Audio level indication for channel 1	Set to "CH1".
Audio level indication for channel 2	Set to "CH2".

Adjusting the Flangeback Distance

This section describes how to adjust the flangeback distance. This needs adjustment in the following cases:

- When the lens is fitted for the first time
- After changing lenses
- If the lens does not stay properly in focus as you zoom from telephoto to wide angle



Adjusting the flangeback distance

1 Set the IRIS selector to M.

2 Turn the iris ring to adjust the aperture to f/1.4 (fully open).

3 Set up a flangeback adjustment chart at 3 meters from the camera, and adjust the lighting to obtain a suitable video level at f/1.4.

4 Release the screw on the F.B. adjustment ring.

5 Set the ZOOM selector to MANU.

6 Turn the manual zoom control to the telephoto position (97.5).

7 Point the camera at the chart, and use the focusing ring to focus on it.

8 Turn the manual zoom control to the wide angle position (7.5).

9 Turn the F.B. adjustment ring until the chart is again in focus, being careful not to disturb the focusing ring.

10 Repeat steps **6** to **9** until the lens is in focus at both telephoto and wide angle positions.

11 Tighten the screw on the F.B. adjustment ring.

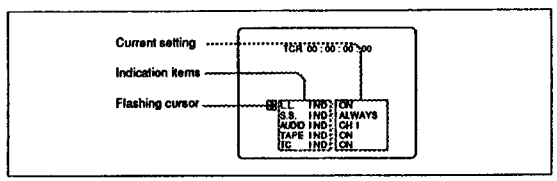
Selecting the Low Light, Tape Remaining and Time Value Indications

Of the items shown in the viewfinder display, you can select whether or not and in some cases how to display the following indications.

- Low light indication
- Tape remaining indication
- Time value indication

This section describes how to select whether or not to display these indications.

1 Press the DISP CHG switch down repeatedly until the menu screen shown below appears on the viewfinder screen.



2 Use the DISP CHG switch to select the required item with the flashing cursor.

Indication item	Representation in the menu
Low light indication	L.L. IND
Tape remaining indication	TAPE IND
Time value indication	TC IND

3 Use the UP/ON and DOWN/OFF buttons to make the selection.

Selection required	Operation
Indication not displayed	Press the UP/ON button to set to "ON".
Indication not displayed	Press the DOWN/OFF button to set to "OFF".

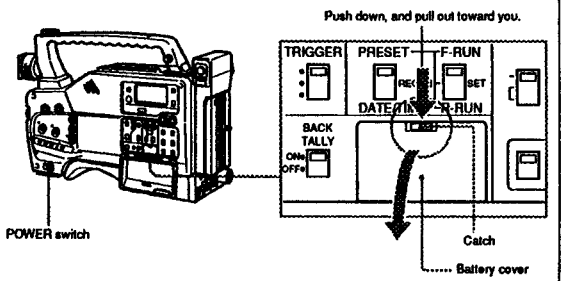
Replacing the Lithium Battery

If the voltage of the lithium battery which is used for memory backup falls, a warning indication ( ) appears in the display window. If this warning appears, replace the lithium battery within two or three days, using a type CR2025 button cell.

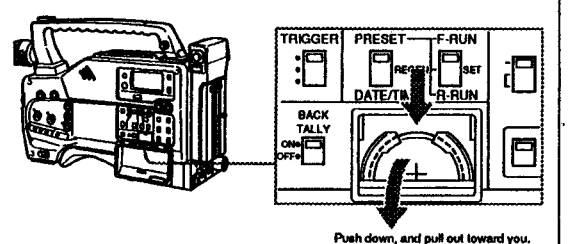
Use the following procedure to replace the lithium battery.

1 Turn the POWER switch on.

2 Press down the catch at the top of the battery cover, and pull toward you.



3 Take out the lithium button cell.



4 Reverse step **3** to insert a replacement lithium button cell.
Take care that **the positive side of the cell, marked with a plus sign is toward you.**

5 Reclose the battery cover.

Notes

- Use a commercially available type CR2025 lithium button cell. Other types of cell may shake loose. If you have difficulty obtaining this type, contact your Sony service representative.
- The lifetime of the lithium battery is approximately two years.

Using the VTR Menu

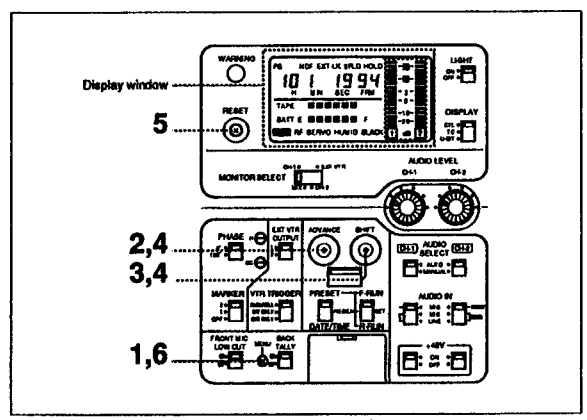
The VTR menu provides the following functions.

VTR menu functions

Function	Menu number
Real time clock and calender settings	101
Cumulative hours counts: • Head drum operating hours • Tape transport operation hours • Operating hours (total with power on)	201
NTSC drop-frame/non-drop-frame mode	204
Standby period setting	207

(In the following description, an underscore indicates a portion of the display which is flashing.)

Basic procedure for settings in the VTR menu



Basic procedure for settings in the VTR menu

1 Press the MENU button.
The "DIAG" indication appears in the display window, and the time code display indicates "101 1994".

2 Press the ADVANCE button to change the leading three-digit number in the time code display to the required menu number.

3 Press the SHIFT button.
The current setting appears. Part of the setting flashes to indicate that it can currently be changed.

4 Use the SHIFT button to switch to the next portion to set, and use the ADVANCE button to change the value of the current flashing portion.

5 Press the RESET button.
This stores the settings, and once again displays the menu number flashing.

6 Press the MENU button.
The display window returns to the state before entering the VTR menu.

Setting the real time clock and calendar

1 Select menu number 101, and press the SHIFT button.
The current date setting appears as an eight-digit number. The format depends on the television standard of the unit.
NTSC versions: US format (mmddyyyy), e.g. 04151994 is April 15, 1994.
PAL versions: European format (ddmmyyyy), e.g. 15041994 is 15 April 1994.

Note

It is not possible to change the first two digits of the year.

2 Use the SHIFT and ADVANCE buttons to obtain today's date.

Ending the setting
Press the RESET button, then the MENU button, to exit the VTR menu.

Continuing to set the time
Proceed to step 3.

3 With the day display flashing (e.g. "04151994"(NTSC)/"15041994"(PAL)), press the SHIFT button.
The current time setting appears as a six-digit number, in 24-hour representation (hhmmss).

E.g. "221505" (22:15 and 5 seconds)

4 Use the SHIFT and ADVANCE buttons to obtain the current time.

5 Press the RESET button, then the MENU button, to exit the VTR menu.
The real time clock starts advancing from the setting at the point when you press the RESET button.

Using the VTR Menu

Displaying the head drum/tape transport/total operation hours

1 Select menu number 201, and press the SHIFT button.
Pressing the SHIFT button cycles through the following displays:
- Head drum operating hours (e.g. "hd 0492")
- Tape transport operation hours (e.g. "tp 0720")
- Total operating hours (e.g. "op 0835")
- Menu number indication ("201 00 ")

2 After checking the displays, press the SHIFT or RESET button to redisplay the menu number.

3 Press the MENU button, to exit the VTR menu.

Selecting drop-frame/non-drop-frame mode (NTSC)

1 Select menu number 204.
The current setting appears beside the menu number (e.g. "204 df ").
df: drop-frame mode (factory default)
ndf: non-drop-frame mode

2 Press the SHIFT button to make the frame mode indication flash (e.g. "204 df "), then press the ADVANCE button.
This toggles the mode between "df" and "ndf".

3 Press the RESET button, then the MENU button, to exit the VTR menu.
The new setting is saved when you press the RESET button.

Setting the standby period

The standby period is the maximum length of time (in minutes) that the unit will remain in the paused state before automatically removing the tape tension.

1 Select menu number 207.
The current setting appears beside the menu number (e.g. "207 8 ").

2 Press the SHIFT button to make the minute count flash (e.g. "207 8 "), then press the ADVANCE button.
Pressing the ADVANCE button cycles through the possible settings:
8(factory default)→1→3→5

3 Press the RESET button, then the MENU button, to exit the VTR menu.
The new setting is saved when you press the RESET button.

Chapter 6
Advanced Recording and Playback Operations

This chapter describes how to record time values to aid indexing for the editing stage, how to synchronize a number of camcorders, simultaneous recording on an external VTR, and how to carry out color playback.

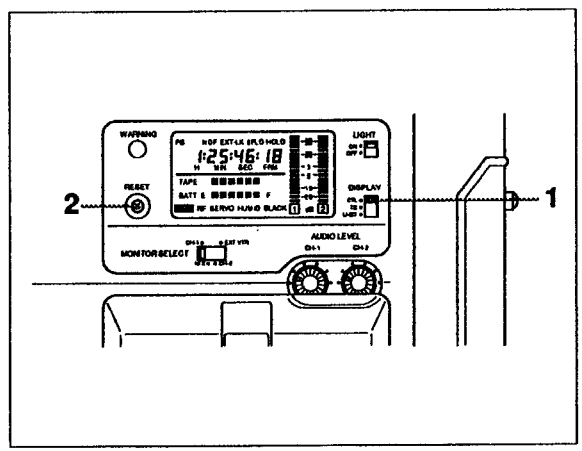
Recording Time Values 6-2
Setting the Counter 6-2
Setting the Time Code Value 6-3
Setting the User Bit Value 6-5
External Synchronization 6-6
Recording on an External VTR 6-8
Simultaneous External and Internal Recording 6-8
Controlling Only the Internal VTR with the VTR Buttons 6-10
Recording on the External VTR Only 6-10
Color playback 6-11

Recording Time Values

This section describes settings for three different techniques for identifying recordings, using the resettable counter, the time code signal, or the user bits included in the time code signal.

Setting the Counter

The counter counts the pulses of the CTL signal on the tape, and when the DISPLAY switch is set to CTL, displays the count value on the viewfinder screen and in the display window, converted to hours, minutes, seconds and frames. The counter value is not, however, displayed in the viewfinder during playback.
Use the following procedure to set the counter value.



Setting the counter value

1 Set the DISPLAY switch to CTL.
The counter value appears in the display window.

2 Press the RESET button.
This resets the value displayed in the viewfinder and display window to "0:00:00:00". The counter then advances as recording proceeds, counting hours, minutes, seconds and frames.

If you rewind the tape after pressing the RESET button
The value turns negative, showing a minus sign.

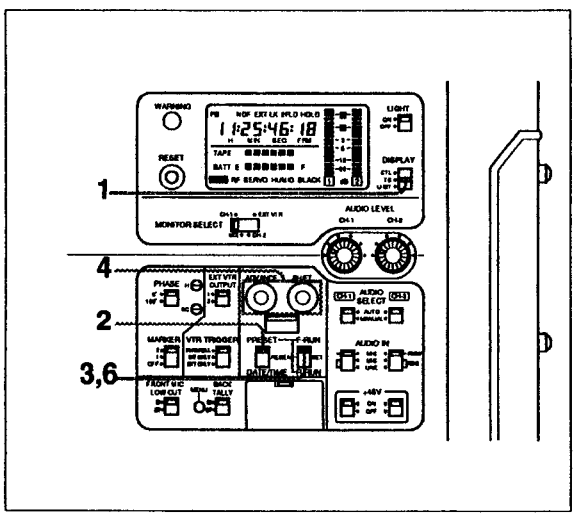
Setting the Time Code Value

If you are using both time code and user bit values, it is recommended to set the user bit value first.
The time code value can be set anywhere in the range from 00:00:00:00 to 23:59:59:29 (NTSC) or 23:59:59:24 (PAL).

For details of the user bit setting, see the section "Setting the User Bit Value" (page 6-5).

Note

This unit uses SMPTE (NTSC)/EBU (PAL) time code for both recording and playback. It is not compatible with other types of time code.



Setting the time code value

1 Set the DISPLAY switch to TC.

2 Set TC mode switch 1 to PRESET.

3 Set TC mode switch 2 to SET.

4 Use the SHIFT button to select the digits to set, and the ADVANCE button to change the value, until the required time code value is displayed.

(Continued)

5 If necessary (NTSC only), select the frame mode (DF/NDF).

For details of the frame mode selection, see the section "Selecting drop-frame/non-drop-frame mode (NTSC)" (page 5-22).
For an explanation of drop-frame and non-drop-frame modes, see the section "Drop-frame mode" (page 6-4).

6 Set TC mode switch 2 to the time code running mode as shown in the following table.

Mode	TC mode switch 2 setting	Effect
Free run: The time code value advances continuously whether recording or not.	F-RUN	The time code value starts advancing immediately.
Record run: The time code value advances only while recording.	R-RUN	The time code value starts advancing when you start recording, and stops between recording sessions.

Resetting the time code value

In step 4 of the procedure above for setting the time code, press the RESET button. This resets the displayed time code to "00:00:00:00", and this value flashes.

Note

If TC mode switch 1 is set to REGEN or DATE/TIME, it is not possible to reset the time code value.

Drop-frame mode (NTSC only)

In the NTSC standard, the time code value is based on 30 frames per second, but the exact video frame frequency is in fact 29.97 frames per second. There is thus a 0.1% discrepancy between the time counted at 30 frames per second and the real time, or 18 frames per 10 minutes.
Drop-frame mode corrects for this by skipping two frame counts at the beginning of every minute which is not a multiple of ten.

For example:

00:05:11:29 ↓ 00:05:12:02
00:05:12:00
00:05:12:01
These two are dropped

In non-drop-frame mode, however, no frame counts are omitted, and there is a gradual deviation of the time code time from real time.

Making the time code continuous

In recording-run mode (when TC mode switch 2 is set to R-RUN), recording a number of scenes on the tape normally produces continuous time codes. If, however, you take the cassette out at some point, the time code will no longer be continuous.

1 Set TC mode switch 1 to REGEN.

2 Use the tape transport buttons to play back.

3 Watching the playback on the monitor, find the end point of the previous recording on the tape from which you wish to continue recording, and press the STOP button.
The tape stops.

4 Press the REC REVIEW button.
This reads the end of the previous recording, and synchronizes the internal time code generator, thus allowing the new time code recorded to follow on consecutively.

Setting the User Bit Value

You can use the user bits to record any identifying code number on the time code track on the tape: this may be the date, time or scene number, for example. User bit values are always expressed as eight-digit hexadecimal values (base 16).

1 Set the DISPLAY switch to U-BIT.

2 Set TC mode switch 1 to PRESET.

3 Set TC mode switch 2 to SET.

4 Use the SHIFT button to select the digits to set, and the ADVANCE button to change the value, until the required user bit value is displayed.

Indications of hexadecimal digits A to F (10 to 15) on the display.

Digit	A	B	C	D	E	F
Display	*A*	*b*	*C*	*d*	*E*	*F*

5 Set TC mode switch 2 to F-RUN (free-run) or R-RUN (record-run).

Resetting the user bit value

In step 4 of the procedure above, press the RESET button. This resets the displayed user bit value to "00 00 00 00".

Setting the time code to the real time clock

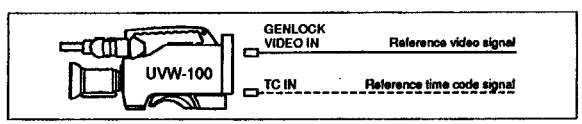
Set TC mode switch 1 to DATE/TIME.
This synchronizes the time code generator to real time, using the real time clock set in the VTR menu. Once you set this switch to the DATE/TIME position, it is not possible to retrieve the previous value in the time code generator.

External Synchronization

This section describes the procedures involved in external synchronization of the camcorder, when using two or more camcorders synchronized for operation with a special effects unit, for example.

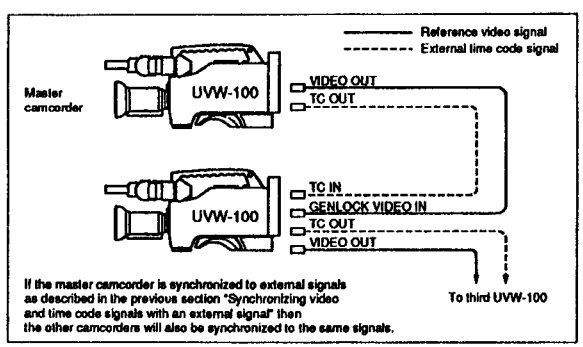
Synchronizing video and time code signals with an external signal

Connect the external reference video and time code signals as shown in the following figure.



Connecting external reference video and time code signals

Synchronizing two or more camcorders


Reference video signal
External time code signal
Master camcorder
UVW-100
VIDEO OUT
TC OUT
UVW-100
TC IN
GENLOCK VIDEO IN
TC OUT
VIDEO OUT
To third UVW-100
If the master camcorder is synchronized to external signals as described in the previous section "Synchronizing video and time code signals with an external signal" then the other camcorders will also be synchronized to the same signals.

Connections for synchronizing two or more camcorders

Phase alignment of the video signals

1 Adjust the subcarrier phase roughly using the PHASE switch.

2 Adjust the subcarrier phase finely using the SC knob, while checking on a Vectorscope.

3 Adjust the horizontal phase using the H knob, checking the waveform on an oscilloscope.

Phase alignment of the time code signals

1 Turn the main unit POWER switch on.

2 Set TC mode switch 2 to F-RUN.

3 Set the DISPLAY switch to TC.

In this state, when you supply external video and time code reference signals, the internal time code generator locks on to the external time code signal. When the indication EXT-LK appears in the display window, the internal time code is now synchronized with the external time code. You can then disconnect the external time code signal, and within the limits of accuracy, the internal time code generator will continue advancing the time code value in synchronization with the external equipment.

Notes

- After synchronizing with the external signal, wait a few seconds while the internal synchronizing circuits stabilize before beginning recording.
- The external synchronization affects only the time code values. It is not possible to synchronize the user bit values.
- Once the internal time code generator is synchronized to an external time code signal, the color frame lock [1] cannot be applied. To apply the color frame lock, first change TC mode switch 2 to the R-RUN position, then return it to the F-RUN position.

1) **Color frame lock:** Setting the frame value in the time code to an odd number for the first and second color fields, and to an even number for the third and fourth fields.

Recording on an External VTR

This section describes how to make recording when an external VTR is connected.

Types of external VTR which can be connected

The VTRs which can be connected and the interface cables required are as shown in the following table.

VTRs which can be connected and cables required

VTR	Cable
BVW-35/35P/50/50P portable VTR, etc.	CCZ-A camera cable (max. length 10 m)
VO-6800/6800P/8800/8800P U-matic VTR, etc.	CCZQ-A camera cable (max. length 10 m)

Notes on connecting an external VTR

- It is not possible to connect a camera control unit.
- There is no power supply connection between the units. You must therefore provide separate power supplies.
  The battery indications (LOW BATT, BATT.END) in the viewfinder applies only to the battery pack on the UVW-100K/100PK/100L/100PL.
  The tally lamp on the viewfinder front and the REC/TALLY and BATT indicators in the viewfinder also reflect the state of the external VTR. Therefore, when recording simultaneously on internal and external VTRs, if either develops a fault, the indicators give a warning. In this case, it is necessary to check, by looking at the indications on the two units, which one is causing the problem.
- To monitor the audio and audible warning indications from the external VTR, using the speaker on this unit or the EAR connector, set the MONITOR SELECT switch to EXT VTR.

Simultaneous External and Internal Recording

Connections

Connect the EXT VTR connector on this unit to the CAMERA connector on the external VTR, and set the audio input level on the external VTR to –20 dB.

Switch settings on the UVW-100K/100PK/100L/100PL

1 Set the VTR TRIGGER switch to PARALLEL.

2 Depending on the VTR connected, set the EXT VTR OUTPUT switch to 1 (component/composite video output) or 2 (Y/C output).

Recording

1 Put the external VTR in the recording paused state.

2 Press the VTR button on the UVW-100K/100PK/100L/100PL body or lens. The external and internal VTRs start recording simultaneously.

3 To pause simultaneous recording, press either VTR button again. Both VTRs go into the recording paused state (standby on).

Changing the setting of the VTR TRIGGER switch during simultaneous recording
Depending on the setting, the VTR buttons now control only one of the VTRs. A VTR which was recording continues recording.

If either VTR comes to end of tape during recording

Even if one VTR stops at the end of tape, the other will continue recording.

To restart simultaneous recording
- When the internal VTR has run out of tape, change the cassette, and press either VTR button. The external VTR will continue recording through this interval.
- When the external VTR has run out of tape, change the cassette, and restart recording with the controls on the external VTR. The internal VTR will continue recording through this interval.

Note

After replacing the cassette on the external VTR, do not press the VTR button on the camcorder, as this will pause the internal VTR.

Using the viewfinder for playback

For the internal VTR: Press the PLAY button.
For the external VTR: While holding down the lens RET button, you can see the return video from the external VTR.

Recording on an External VTR

Controlling only the Internal VTR with the VTR Buttons

Set the VTR TRIGGER switch to INT ONLY.
Even if an external VTR is connected, the two VTR buttons control only the internal VTR. It is then necessary to start and stop recording on the external VTR using its own controls.

Recording on the External VTR Only

Connections and switch settings

With the connections the same as described above for simultaneous recording, set the VTR TRIGGER switch to EXT ONLY. The VTR buttons on the UVW-100K/100PK/100L/100PL body and lens now control only the external VTR.

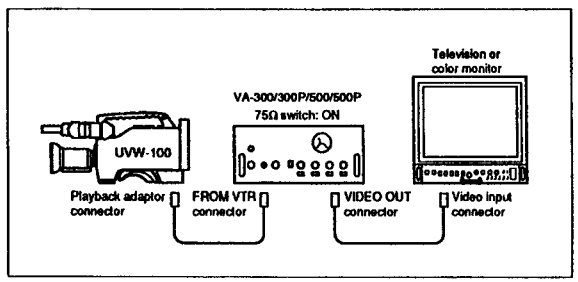
Recording

Use the controls on the external VTR to put it in the recording paused state, then press the VTR button on the UVW-100K/100PK/100L/100PL body or lens. The external VTR starts recording.

To pause recording
To pause recording, press either VTR button again.

Color playback

To monitor color playback video from the UVW-100K/100PK/100L/100PL, connect a VA-300/300P/500/500P playback adaptor (not supplied) to the unit, and a television or color monitor to the VA-300/300P/500/500P as shown in the following figure, and press the PLAY button.



Color playback

Notes

- If you use the recording review function with the playback adaptor connected, the output signals to the playback adaptor are the same as the viewfinder video and audio monitor.
- If you press the STOP button when using the playback adaptor for playback, the output signals to the playback adaptor switch to E-E mode video and audio.
- When using a VA-500/500P for playback, ensure that the switches below the AUDIO LEVEL CH-3 and CH-4 adjustment knobs on the VA-500/500P are off.

Chapter 7
Maintenance

Warning System 7-2
Troubleshooting 7-3
Care of the Unit 7-4

Warning System

When the unit is powered on, or if a fault occurs during operation, a warning is given in the following ways:

- By the warning indicators and messages in the viewfinder.
- By warning indications in the display window.
- By means of the WARNING indicator together with a warning tone from the speaker or earphone.

You can adjust the volume of the warning tone with the ALARM knob. When this knob is turned to the minimum position, there is no sound output at all.

Operation warnings and action to be taken

VTR				Camera				
Display window		Warning indicators	Warning tones	Viewfinder indicators		Problem	Machine action	What to do
Warning indication	State (Flashing/ Continuous)	☼ Continuous ✷ 1 flash/s ✷ 4 flashes/s	Continuous 1 beep/s 4 beeps/s	REC ☼ Continuous ✷ 1 flash/s ✷ 4 flashes/s	BATT Flashing			
RF	Continuous[a]	✷ [a]	[a]	✷ [a]		Video head gaps clogged or problem in recording circuit.	After detecting head clogging, recording continues but quality is poor.	Clean the heads. If the problem persists, power off, and consult your Sony service representative.
SERVO	Continuous[a]	✷ [a]	[a]	✷ [a]		Servo lock lost.	Recording continues but quality is poor. Recording continues but quality is poor. The warning indicator may sometimes flash for a short time at the beginning of recording.	Power off, and consult your Sony service representative.
HUMID	Continuous	☼				Condensation on head drum.	The unit stops, and all operations are inhibited except eject.	Stop the tape and wait for the condensation to evaporate. You can start using the unit again when it is possible to power on without the HUMID indication appearing.
SLACK	Continuous	✷				The tape cannot be wound properly.	Operation stops.	Consult your Sony service representative
TAPE	Flashing[a] (1 flash/s)	✷ [a]	[a]	✷ [a]		Close to the end of tape.	Operation continuous.	Replace the cassette as soon as possible.
	Flashing (4 flashes/s)	☼				End of tape.	Recording, playback or fast forward stops.	Replace the cassette or rewind.
BATT	Flashing	✷		✷ [b]	✷	Battery almost exhausted.	Operation continues.	Replace the battery as soon as possible.
	Continuous	☼	[a]		☼	Battery exhausted.	Operation stops.	Replace the battery.

a) During recording only. b) Except during playback, fast forward, rewinding and recording review.

For details of error messages displayed in the viewfinder, see the section "Normal viewfinder display indications" (page 4-9).

Troubleshooting

You can use this chart to establish possible causes of an apparent problem; always double-check before sending the unit for repair. If a problem persists, contact your Sony service representative.

Troubleshooting chart

Symptoms	Cause	Remedy
The unit does not power on when you switch the POWER switch on.	• There is no battery pack loaded. • The battery pack has reached the end of its usable life. • The AC power adaptor is not connected.	• Load a battery pack. • Replace the battery pack with a fully charged one. • Connect the AC power adaptor.
The tape transport does not operate when you press either VTR button.	• The POWER switch is turned off. • The VTR has reached the end of tape. • The cassette has the record-inhibit plug pushed in.	• Turn the POWER switch on. • Rewind the tape, or load a new cassette. • Either load a new cassette, or pull the record-inhibit plug out.
The tape transport does not operate when you press any tape transport button.	The VTR has reached the end of tape.	Either rewind the tape, or load a new cassette.
The video and audio E-E output is not present.	The POWER switch is turned off.	Turn the POWER switch on.
The power supply cuts while operating.	The battery pack is exhausted.	Replace the battery pack with a fully charged one.
The battery goes dead very quickly.	• The operating temperature is very low. • The battery pack is inadequately charged.	Recharge the battery pack, or replace with a new fully charged battery pack.
It is not possible to eject the cassette.	• The battery pack is exhausted. • The POWER switch is turned off.	• Replace the battery pack with a fully charged one. • Turn the POWER switch on.
The playback picture quality is poor.	The video heads are dirty.	Clear the video heads using a BCT-5CLN cleaning cassette. *For details of head cleaning, see the section "Cleaning the video heads" (page 7-4).*
All controls except the EJECT button are disabled.	There is condensation on the head drum.	Remove the cassette, power off, and wait until the condensation has evaporated.
Audio recording is not possible.	The AUDIO LEVEL (CH-1/CH-2) knobs are set to the minimum level.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs.
The recorded sound is distorted.	The audio level is too high.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs, and record again.
The recorded sound has a high noise level.	The audio level is too low.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs, and record again.
The image in the viewfinder is blurred.	• The viewfinder is not focused correctly. • There is condensation on the lens.	• Adjust the viewfinder focusing ring. • Power off, and wait until the condensation has evaporated from the lens.

Care of the Unit

Cleaning the video heads

Always use the special-purpose Sony BCT-5CLN cleaning cassette for cleaning the audio and video heads. Follow the instructions with the cleaning cassette carefully, as inappropriate use of the cleaning cassette can damage the heads.

Replacing the video heads

If cleaning the video heads fails to restore picture quality, the heads may be due for replacement.
Keep a check of the hours of head drum operation: with normal use, the heads should need replacing after about 500 hours of use.
When the heads need replacement, contact your supplier or Sony service representative.

You can check the head drum operating hours using the VTR menu. For details see the section "Using the VTR Menu" (page 5-20).

Replacing other parts

For replacement of all parts other than the video heads, contact your supplier or Sony service representative.

Cleaning the lens and viewfinder

Use a blower to remove dust from the CRT screen and mirror in the viewfinder tube.
Use a commercially available lens cleaner to clean the lens and protective filter.

Note

Never use thinners or other organic solvents.

Appendix

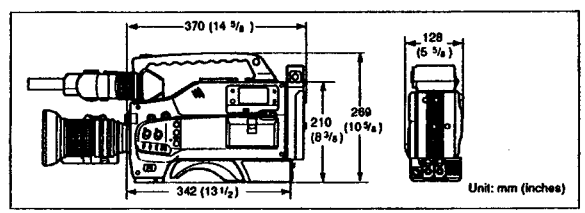
Specifications A-2

Specifications

General

Power supply voltage	12 V DC $^{+1}_{-1}$ V AC-550/550CE AC adaptor or CMA-8A/8ACE camera adaptor is usable.
Power consumption	20 W (not including lens and viewfinder)
Continuous operating time	About 60 minutes (using NP-1B battery pack)
Operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Operating humidity	25% to 85% (cannot be used when condensation present)
Storage temperature	–20 °C to +60 °C (–4 °F to 140°F)
Mass	6.9 kg (15 lb 3 oz) (including DXF-501/501CE viewfinder, VCL-713BX zoom lens, NP-1B battery pack, and UVWT-30MA cassette tape)

External dimensions in mm (inches)



Specifications

Video camera

General

Imaging system	Interline transfer three-chip CCD
Optical system	f/1.4 prism type
Effective picture elements	
	UVW-100K/100L: 768 × 492 (horizontal × vertical)
	UVW-100PK/100PL: 752 ×592 (horizontal × vertical)
Imaging area	6.4 × 4.8 mm ($^{9}/_{32} \times {}^{7}/_{32}$ inches)
Built-in filters	1: 3200 K
	2: 5600 K + $^{1}/_{16}$ ND
	3: 5600 K
Lens mounting	Bayonet mount

Video

Signal format	UVW-100K/100L: EIA standards, NTSC color system
	UVW-100PK/100PK: CCIR standards, PAL color system
Scan system	UVW-100K/100L: 2:1 interlace, 525 lines, 60 fields/s
	UVW-100PK/100PL: 2:1 interlace, 625 lines, 50 fields/s
Horizontal scan rate	UVW-100K/100L: 15.734 kHz
	UVW-100PK/100PL: 15.625 kHz
Vertical scan rate	UVW-100K/100L: 59.94 Hz
	UVW-100PK/100PL: 50.00 Hz
Synchronization	Internal or external, using BS or VBS input to GEN LOCK VIDEO IN connector
Horizontal resolution	700 lines (central portion)
Minimum illumination level	
	7.5 lx (at f/1.4, +18 dB gain)
Sensitivity	2000 lx at 89.9% reflectance (f/8.0 standard, 3200 K)

Functions

Video output levels	0 dB, and MID and HIGH settings (1 dB ≤ MID < HIGH ≤ 18 dB), AGC
Electronic shutter	• Off, $^{1}/_{60}$ (UVW-100PK/100PL), $^{1}/_{100}$ (UVW-100K/100L), $^{1}/_{250}$, $^{1}/_{500}$, $^{1}/_{1000}$, $^{1}/_{2000}$ second • Clear scan function, 59.9 to 200.3 Hz (UVW-100K/100L)/50.0 to 201.5 Hz (UVW-100PK/100PL) • Automatic exposure (AE) function, $^{1}/_{60}$ (UVW-100K/100L) or $^{1}/_{50}$ (UVW-100PK/100PL) to $^{1}/_{250}$ second
Video output	VBS: 1.0 V p-p, sync negative, 75 Ω
Video signal-to-noise ratio	
	UVW-100K/100L: 60 dB (standard)
	UVW-100PK/100PL: 58 dB (standard)
Registration	0.05% overall (excluding lens distortion)
Geometric distortion	Below measurable limit (excluding lens distortion)

VTR

General

Tape speed	UVW-100K/100L: Approximately 118.6 mm/s
	UVW-100PK/100PL: Approximately 101.5 mm/s
Recording/playback time	
	Using BCT-30MA/UVWT-30MA
	UVW-100K/100L: Maximum 30 minutes
	UVW-100PK/100PL: Maximum 35 minutes
Fast forward time	Maximum 7.5 minutes (using BCT-30MA/UVWT-30MA)
Rewind time	Maximum 5.5 minutes (using BCT-30MA/UVWT-30MA)
Cassette tapes used	Betacam SP $^{1}/_{2}$-inch metal tape BCT-5MA/10MA/20MA/30MA, UVWT-10MA/20MA/30MA or equivalent

Video system

Recording system: Luminance: Frequency modulation
Color difference: Time division time compression FM

Bandwidth	Luminance	NTSC: 30 Hz to 4.0 MHz + $^{+1.0}_{-4.0}$ dB
		PAL: 25 Hz to 5.0 MHz + $^{+1.0}_{-4.0}$ dB
	Color difference	NTSC: 30 Hz to 1.5 MHz + $^{+1.0}_{-4.0}$ dB
		PAL: 25 Hz to 1.5 MHz + $^{+1.0}_{-4.0}$ dB
S/N ratio	Luminance	NTSC: At least 49 dB
		PAL: At least 46 dB
	Color difference	NTSC: At least 47 dB
		PAL: At least 44 dB

Audio system

Recording system: Fixed heads

Frequency characteristics	50 Hz to 12.5 kHz + $^{+2.0}_{-3.0}$ dB
S/N ratio (at 3% distortion level for NTSC) (Referred to peak level [a], weighted CCIR 468-3 for PAL)	NTSC: 70 dB or more, PAL: 60 dB or more
Distortion (THD) (1 kHz reference level)	1.5% or less
Wow and flutter	0.18% rms or less

a) Peak level= +8dB about operational level

Inputs and outputs

Input connectors
CH-1(+48V) / CH-2(+48V) (XLR 3-pin, ×2)
–60 dBu, 3 kΩ / +4 dB, 10 kΩ (0 dBu: 0.775 Vrms)
GENLOCK VIDEO IN (BNC)
1.0 Vp-p, 75 Ω
TC IN (BNC) 0.5 to 5 Vp-p, 10 kΩ
MIC IN +48V (XLR 3-pin)
–60 dBu, 3 kΩ
DC IN (XLR 4-pin, male)

Output connectors
VIDEO OUT (BNC ×2) 1.0 Vp-p, 75 Ω
TC OUT (BNC) 1.0 Vp-p, 75 Ω
EAR (stereo mini-jack) variable –∞ to –20 dBu, 8 Ω
Playback adaptor (round, 20-pin)

External VTR connector
EXT VTR (CCZ, 26-pin)

Remote control connector (for RM-B1)
REMOTE (mini-jack) Recording trigger input, tally LED output

Miscellaneous
LENS (12-pin)
VF (8-pin)
Zoom remote control (8-pin)

DXF-501/501CE viewfinder

Picture tube	1.5-inch, monochrome, quick start type
Indicators	REC/TALLY, BATT, SHUTTER, GAIN UP
Resolution	600 lines
Power supply voltage	12 V DC
Power consumption	2.3 W
Mass	500 g approx. (1 lb 1 oz)
Maximum external dimensions	182 (W) × 68 (H) × 205 (D) mm (7 1/4 × 2 3/4 × 8 1/8 inches)

Specifications

VCL-713BX zoom lens

Focal length	7.5 to 97.5 mm (5/16 to 3 7/8 inches)
Zoom ratio	13:1
Zoom operation	Manual or motorized, selectable
Maximum aperture	1:1.4
Iris	Automatic or manual, selectable; f/1.4 to f/16 and C (macro)
Subject area (at 1.0 m)	Wide angle: 785 × 589 mm (31 × 23 1/4 inches) Telephoto: 61.7 × 46 mm (2 1/2 × 1 13/16 inches)
Minimum focusing distance	1.0 m (39 3/8 inches), 50 mm (2 inches) in macro mode
Filter attachments	72 mm dia., 0.75 mm pitch 82 mm dia., 0.75 mm pitch (lens hood)
Mounting	Bayonet mount
Mass	950 g approx. (2 lb 1 oz) (including hood)
Maximum external dimensions	113 × 177 mm (4 1/2 × 7 inches) (including hood)

Supplied accessories

VCL-713BX zoom lens (with UVW-100K/100PK only) (1)
DXF-501/501CE viewfinder (1)
Microphone (for +48V power supply)
VCT-U14 tripod attachment (1)
Lens mount cap (1)
Shoulder strap (1)
Flangeback adjustment chart (1)
Operation manual (1)

Design and specifications are subject to change without notice.

Related Equipment

DXF-40B/40BCE 4-inch viewfinder
DXF-50B/50BCE 5-inch viewfinder
NP-1B and BP-90A battery packs
BC-410/410CE and BC-1WB battery chargers
DC-520 battery adaptor (holds two NP-1B battery packs)
DC-500 battery case (for BP-90A)
AC-550/550CE and CMA-8A/8ACE AC adaptors
CAC-12 microphone holder
EC0.3C2/EC0.5C2 microphone cable
ECM-670/672 electret capacitor microphone
ME-20B earphone
WRT-57/67 wireless microphone
WRR-28/830 UHF portable tuner
VA-300/300P/500/500P playback adaptor
RM-81 remote control unit
CAC-4 chest pad

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  - CN-992 Board ..... ①
  - DC-62 Board ..... ⑳
  - DC-63 Board ..... ㉑
  - ES-7 (UC) / ES-7P (EK) Board ..... ⑯
  - IE-33 (UC) / IE-33P (EK) Board ..... ⑮
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  - MAIN Board (VF Board) ..... ①
  - SW Board ..... ②

2-3. PRINTED CIRCUIT BOARD

Circuit information is provided below.

CAMERA

System	Circuit Board	Circuit Function
VIDEO	ES-7/ES-7P	CHROMA ENCODER SYNC GENERATOR
	IE-33/IE-33P	VIDEO AMP IMAGE ENHANCER COLOR BAR GENERATOR
	IF-454	VTR, 26PIN INTERFACE
	PR-208	VIDEO PROCESS
SYSCON	AT-85	CAMERA SYSTEM CONTROL
Others	CN-992	FRONT MIC CN
	MB-530/ MB-530P	CAMERA MOTHER BOARD CCD TIMING PULSE GENERATOR
	SW-654	MODE SW
	SW-655	MODE SW
	SW-656	MODE SW

VTR

System	Circuit Board	Circuit Function
VIDEO	VO-46/ VO-46A	VIDEO SIGNAL PROCESS
AUDIO	AU-185/ AU-185P	LAU REC/PB AMP
	FE-18	ERASE/BIAS OSC
SYSCON SERVO	KY-285	VTR FUNCTION KEY BLOCK
	SR-55	VTR MECHANICAL POSITION SENSOR
	SS-57/SS-57A	SERVO & SYSTEM CONTROL
POWER	DC-62 (inc. DC-63)	DC-DC CONVERTER
Others	CN-935	VIDEO/TC CONNECTOR PB ADAPTOR
	CN-936 (inc. LED-214)	EARPHONE/REMOTE JACK BEAR TALLY LAMP
	DR-254	DRUM MOTOR DRIVE
	MB-506	VTR MOTHER BOARD
	TC-86/ TC-86A	TC GENERATOR AUDIO AMP

2-4. PRECAUTIONS ON TIGHTENING THE SCREWS

(1) The Fixing Screws to the Chassis

The UVW-100 is compact and lightweight, so many M1.4×2.5 screws (1.4 mm dia.) and M2 × 5 and M2 × 8 screws (2 mm dia.) are employed.
An aluminum diecast chassis is employed. Pay careful attention to the tightening torque when tightening the screws. Stronger torque may damage the chassis screws.
The torque screwdriver and bits below are provided.

	SONY Parts No.
Torque driver	J-6325-400-A
Bit for M1.4	J-6325-110-A
Bit for M2	J-6325-380-A
Screw M1.4 torque:	0.09 ± 0.01 N.m (0.9 ± 0.1 kg.cm)
Screw M2 torque:	0.03 ± 0.05 N.m (3.0 ± 0.5 kg.cm)

The above torque driver can be used for both screws M1.4 and M2.

If you damage the chassis screws when tightening screw M1.4, use the following screw:

	SONY Parts No.
M1.7 × 3	2-641-348-02
or	
M1.4 × 5	3-729-013-71

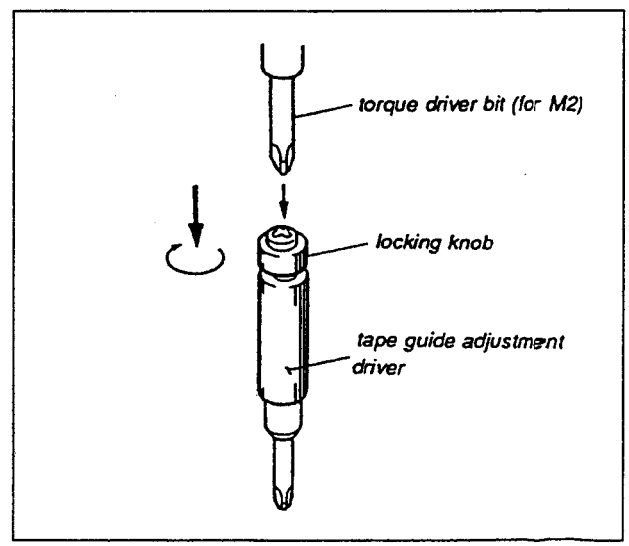
To distinguish the above screw from screw M1.4, mark the screw top in red. Apply the locking compound at the same time.

(2) The Locking Screw of the Tape Guide Upper Flange

When the height adjustment of the tape guide is performed in the Tape Run Alignment, use the tape guide adjustment driver (SONY Parts No. : J-6321-500-A) prepared for the maintenance tool.
After the height adjustment of the tape guide is completed, tighten the locking screw of the tape guide upper flange with the torque driver by the following procedures.

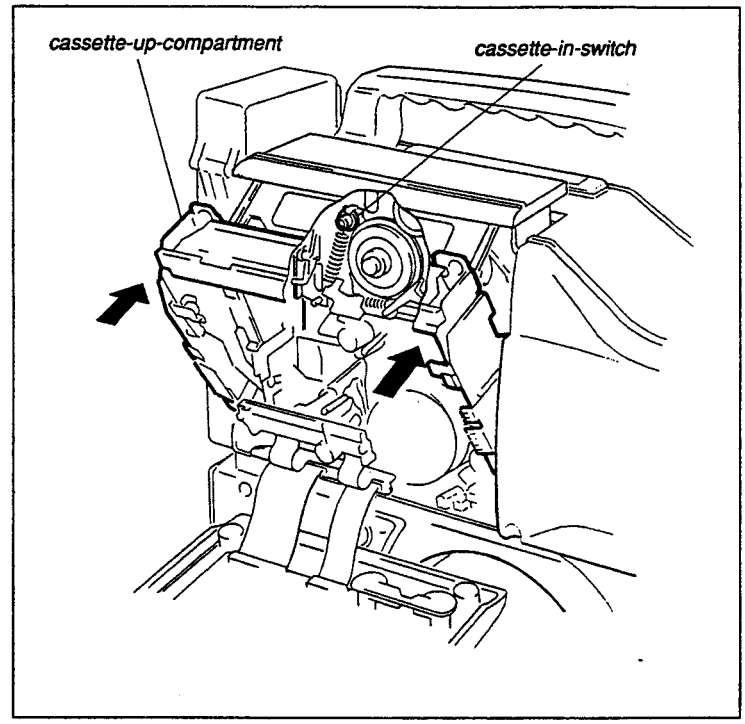
	SONY Parts No.
Torque Driver	J-6325-400-A
Torque Driver	J-6325-400-A
Torque Driver Bit (For M2)	J-6325-380-A
Tightening Torque	0.09 ± 0.01 N.m (0.9 ± 0.1 kg.cm)

(a) Set the torque driver bit (for M2) on the torque driver.
(b) Set the torque driver on the screw at the top of the locking knob of the tape guide adjustment driver.
(c) Push down the torque driver and turn it clockwise.



2-5. USING THE UNIT WITHOUT THE CASSETTE TAPE

1. Put the unit into EJECT mode.
2. Remove the cassette-up compartment lid. (refer to section 2-1)
3. While pressing the Cassette-in switch, press both sides of the arm of the cassette-up compartment at the same time, and lock the arm.
   (NOTE) When pressing the arm of the cassette-up compartment, take great care not to damage it.
4. After moving the reel chassis, press the Cassette-in switch.
5. Press the desired mode button.

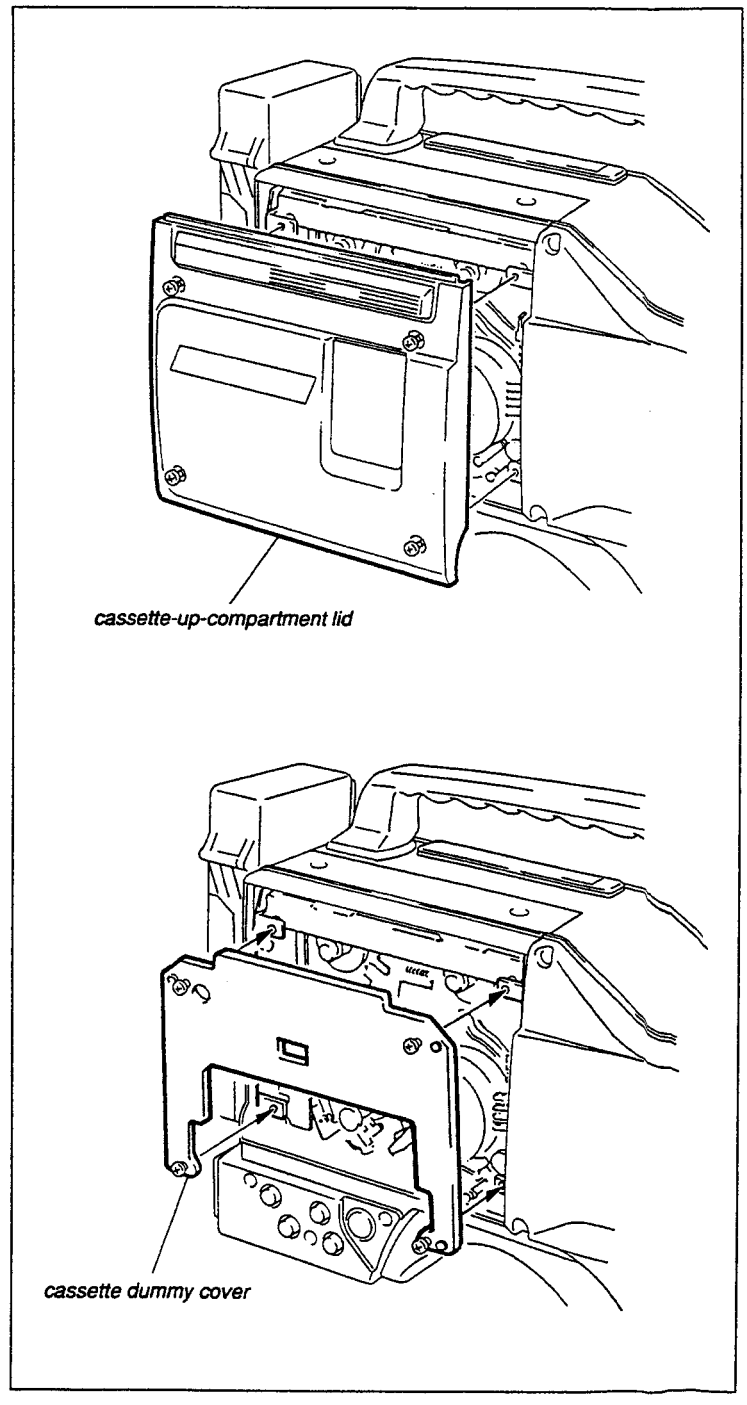


2-6. TAKING UP SLACK IN THE CASSETTE TAPE

1. Turn off the power switch.
2. Remove four screws, then remove the cassette-up compartment lid. (Refer to Section 2-1.)
3. Install the cassette dummy cover. (fixtures for service)

NOTE:

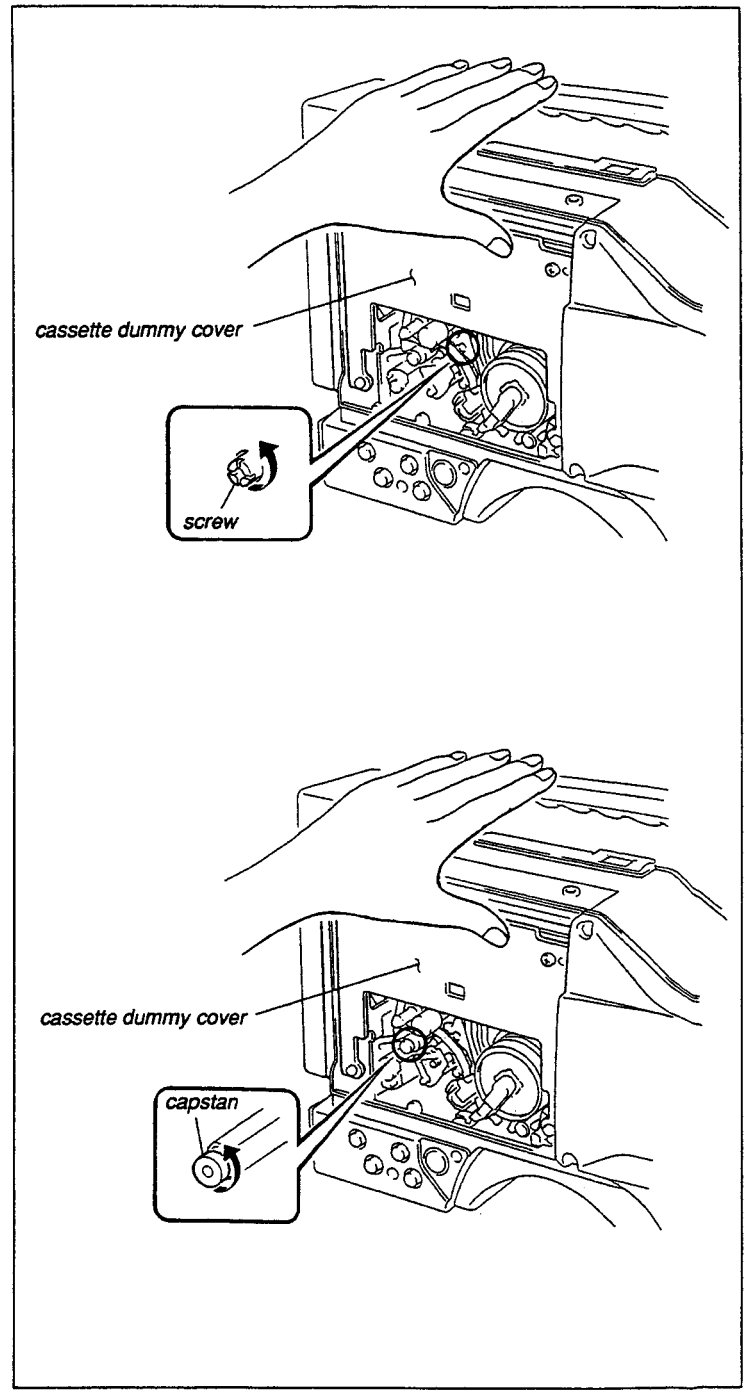
- Remove the lid gently it because it is connected to the AU-185 Board with flat cable and flexible card wire.
- After removing the cassette-up compartment lid, be sure to install the cassette dummy cover for reinforcement before operating because the cassette-up compartment lid is fragile.



4. While holding the cassette dummy cover downwards, turn the screw in the counterclockwise shown in the figure about four times with phillips screwdriver.

5. Turn the Capstan in the counterclockwise direction with fingers until the feed side of the cassette tape begins to rotate.

6. After winding the tape onto the cassette, release the cassette dummy cover, then take out the cassette tape.



2-7. CLEANING WHEN HEADS ARE CLOGGED

If the video head is clogged, clean the head as described in the following procedures.

• Cleaning with the cleaning cassette

1. Insert the cleaning cassette BCT-5CLN in the unit, then play back the tape for five seconds, and eject the tape at once.

   NOTE: • Make sure to use the cleaning cassette BCT-5CLN.
   If the cleaning is performed by cleaning cassettes other than the BCT-5CLN, abnormal friction or damage of the video head may occur.
   • Do not use the cleaning cassette with rewind.

2. Confirm that the head clog is clear.
   If the video head is clogged after cleaning with the cleaning cassette, clean the video head as described in the following procedure.

• Cleaning with the cleaning piece

1. Hold the cleaning piece moistened with cleaning fluid against the heads gently.

2. Slowly rotate the upper drum in the direction of the head's rotation with hand and clean the video head.

   NOTE: • Do not move the cleaning piece in a vertical direction. This will damage the video head.
   • Make sure to turn the POWER OFF, when cleaning is performed.

2-8. RELEASING THE HUMID TIMER WHEN THE UNIT IS HUMIDIFIED

When HUMID MODE is off in the SYSTEM MENU No.402, HUMID ALARM is displayed to protect the tape if the unit is humidified, and the VTR stops for a period specified by the HUMID TIMER.
The HUMID TIMER stops the operations of the unit to protect the tape if the unit becomes humidified, and this timer is designed to dehumidify the unit when left alone.
Therefore, if there is no humidity in the unit after the humidity is removed artificially, the unit cannot be started because the HUMID TIMER is not canceled.
To cancel the HUMID TIMER and start the VTR after removing the humidity artificially, perform the following steps:

1. Go to the SYSTEM MENU (refer to section 2-22) and enter HUMID TIMER OFF mode (MENU No.509).

   * xxx indicates the remaind time (min)

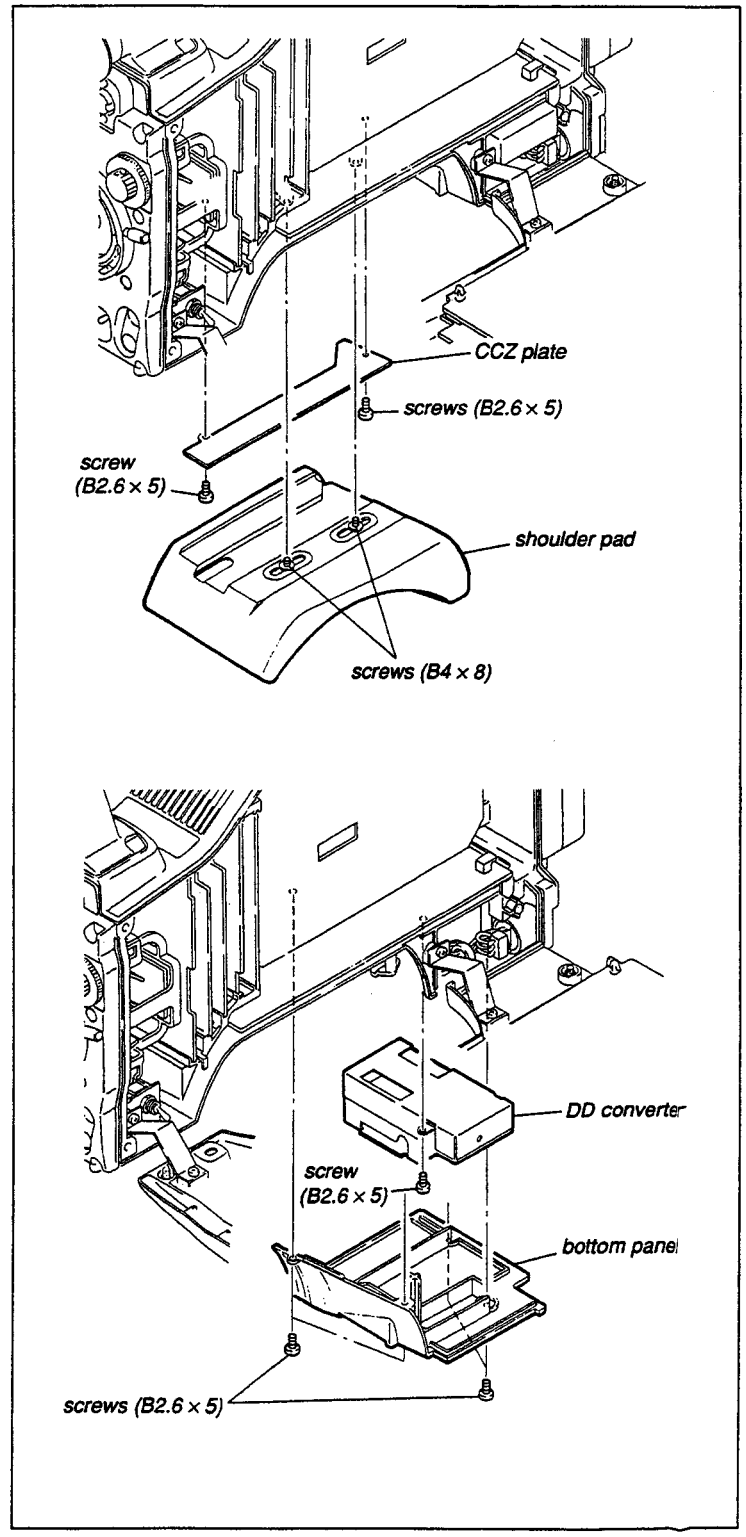
2. Press RESET twice to set XXX to 0 in order to cancel the HUMID TIMER.

* However, if the unit is still humidified, the timer cannot be canceled.

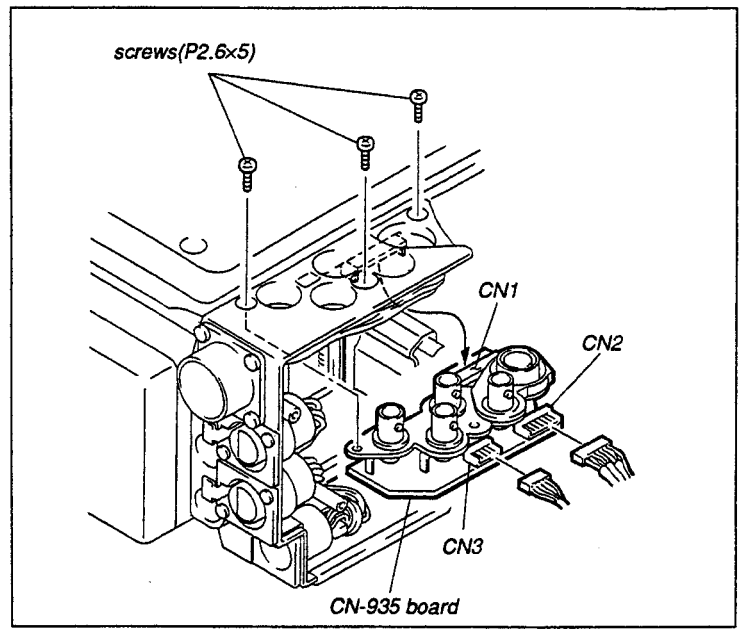
2-9. REMOVAL/INSTALLATION OF THE BOARDS

2-9-1. CN-935 Board

1. Open the right side panel. (Refer to Section 2-1.)
2. Loosen two screws (B4 × 8), then remove the shoulder pad. (These screws are retained on the shoulder pad, so they aren't out of it.)
3. Remove two screws (B2.6×5), then remove the CCZ plate.
4. Remove four screws (B2.6×5), then remove the bottom panel.
5. Remove the screw (B2.6×5) shown in the figure, then remove the DD Converter.

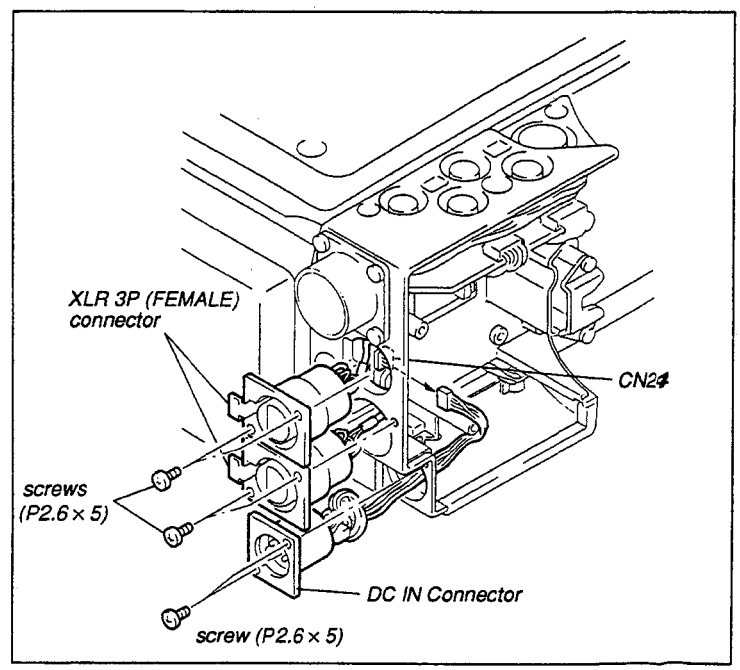


6. Remove the three screws (P2.6×5) shown in the figure and disconnect the connector (CN1) of the CN-935 board, then pull out the board.
7. Disconnect the two connector (CN2, CN3) of CN-935 board, then remove the board.

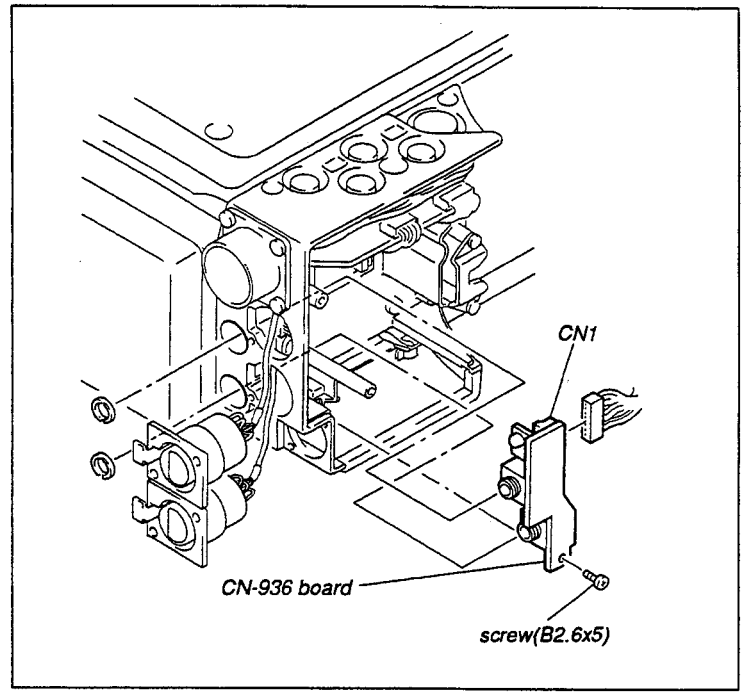


2-9-2. CN-936 board

1. Open the right side panel. (Refer to Section 2-1.)
2. Remove two screws (B4 × 8), then remove the shoulder pad. (Refer to Section 2-9-1.)
3. Remove two screws (B2.6×5), then remove the CCZ plate. (Refer to Section 2-9-1.)
4. Remove four screws, then remove the bottom panel. (Refer to Section 2-9-1.)
5. Remove the DD Converter. (Refer to Section 2-9-1.)
6. Remove two screws (P2.6 × 5) shown in the figure and disconnect the connector (CN-24) of the MB-506 board, then remove the DC IN connector.
7. Remove four screws (P2.6 × 5) shown in the figure, then remove two XLR connector (3P, FEMALE).

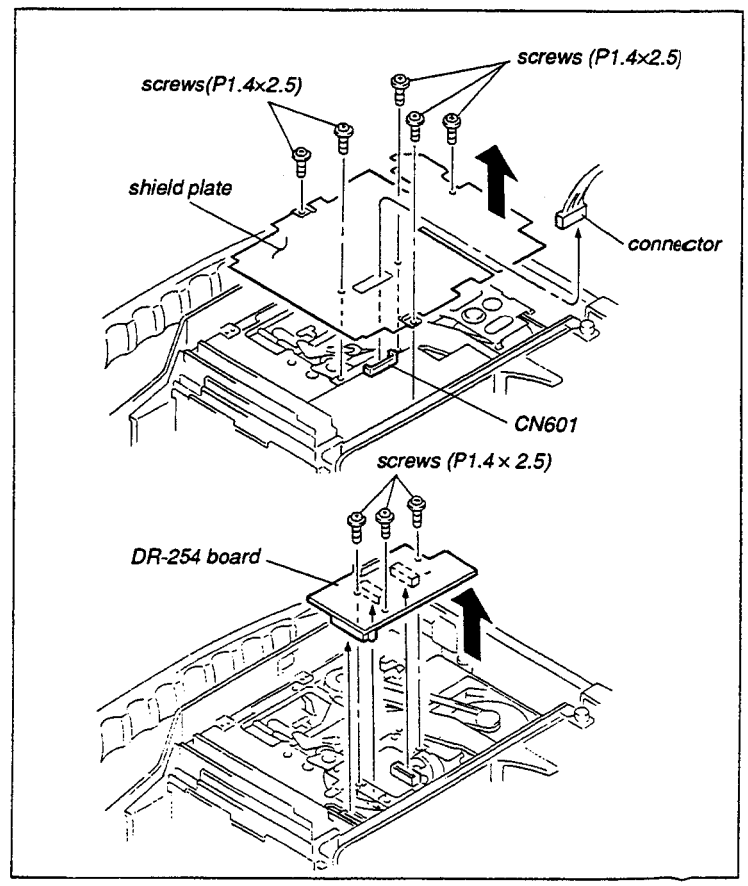


8. Remove the screw (B2.6 × 5) of the CN-936 board.
9. Remove the earphone jack and the remote jack with the jack not driver.
   (SONY Parts No.: 7-700-742-03)
10. Disconnect the connector (CN1) of the CN-936 board , then remove the board.



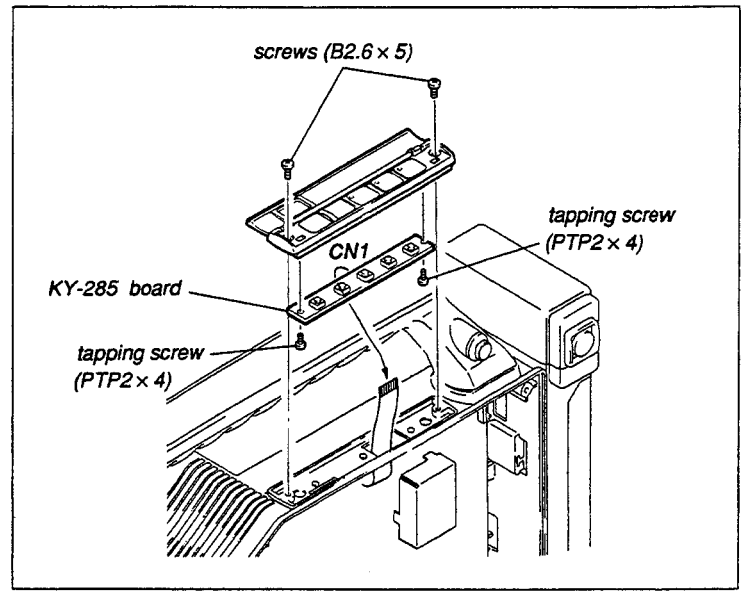
2-9-3. DR-254 board

1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the SS-57 board. (Refer to Section 2-9-7.)
3. Disconnect the connector (CN601) of the DR-254 board.
4. Remove five washerhead screws (P1.4 × 2.5), then remove the shield plate.
5. Remove three washerhead screws (P1.4 × 2.5), then remove the board.



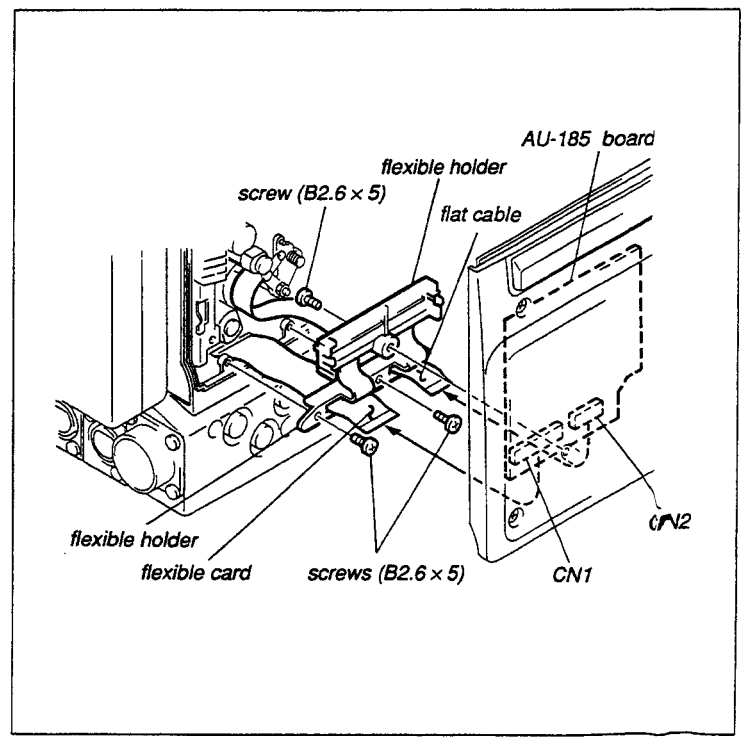
2-9-4. KY-285 board

1. Remove two screws (B2.6 × 5) of Key panel Ass'y.
2. Disconnect the flat cable (CN1) of the KY-285 board.
3. Remove two tapping screws (PTP2 × 4) of the KY-285 board, then remove the board.

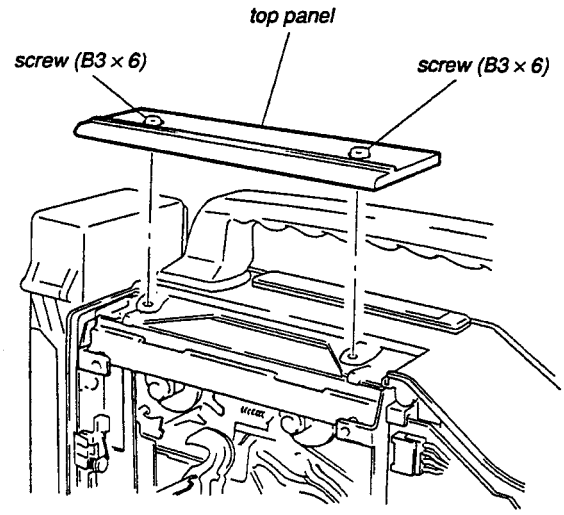


2-9-5. MB-506 board

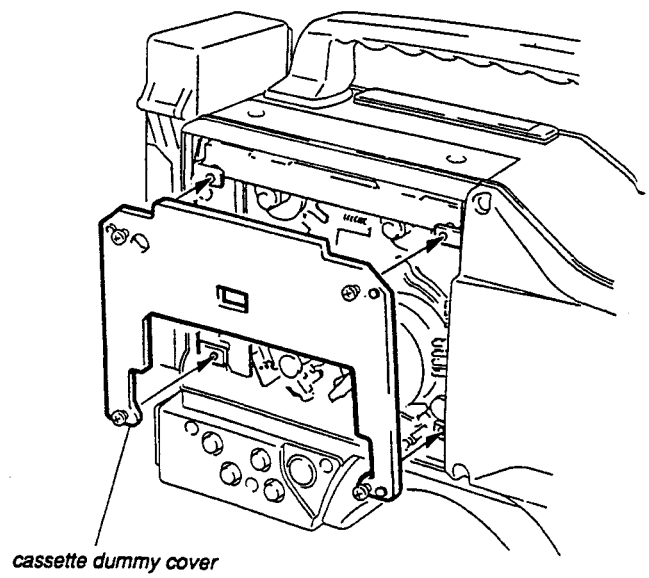
1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the SS-57 board. (Refer to Section 2-9-7.)
3. Pull out the card boads. (Refer to Section 2-9-12.)
4. Remove the left side panel and the cassete-up compartment lid. (Refer to Section 2-1)
5. Remove the three screws (B2.6 × 5) of the flexible holder, then disconnect the flexible card wire (CN1), and the flat cable (CN2) of the AU-185 board.



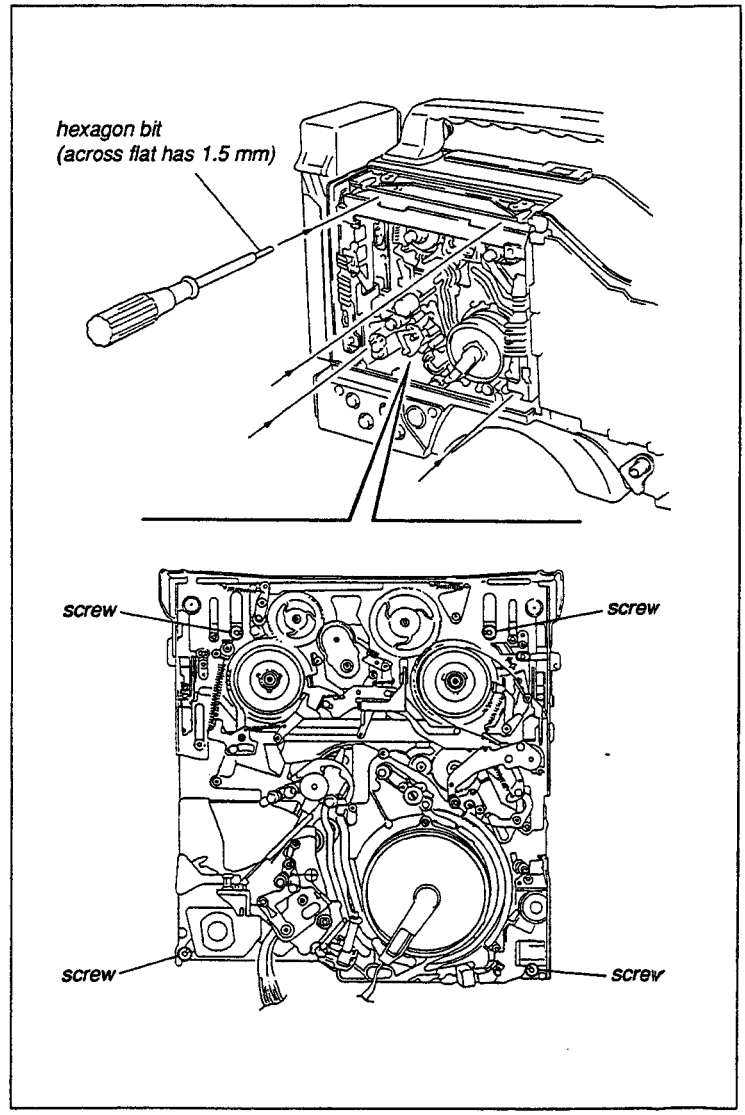
6. Loosen two screws (B3 × 6), then remove the TOP panel. (These screws are retained on the top panel, so they aren't out of it).



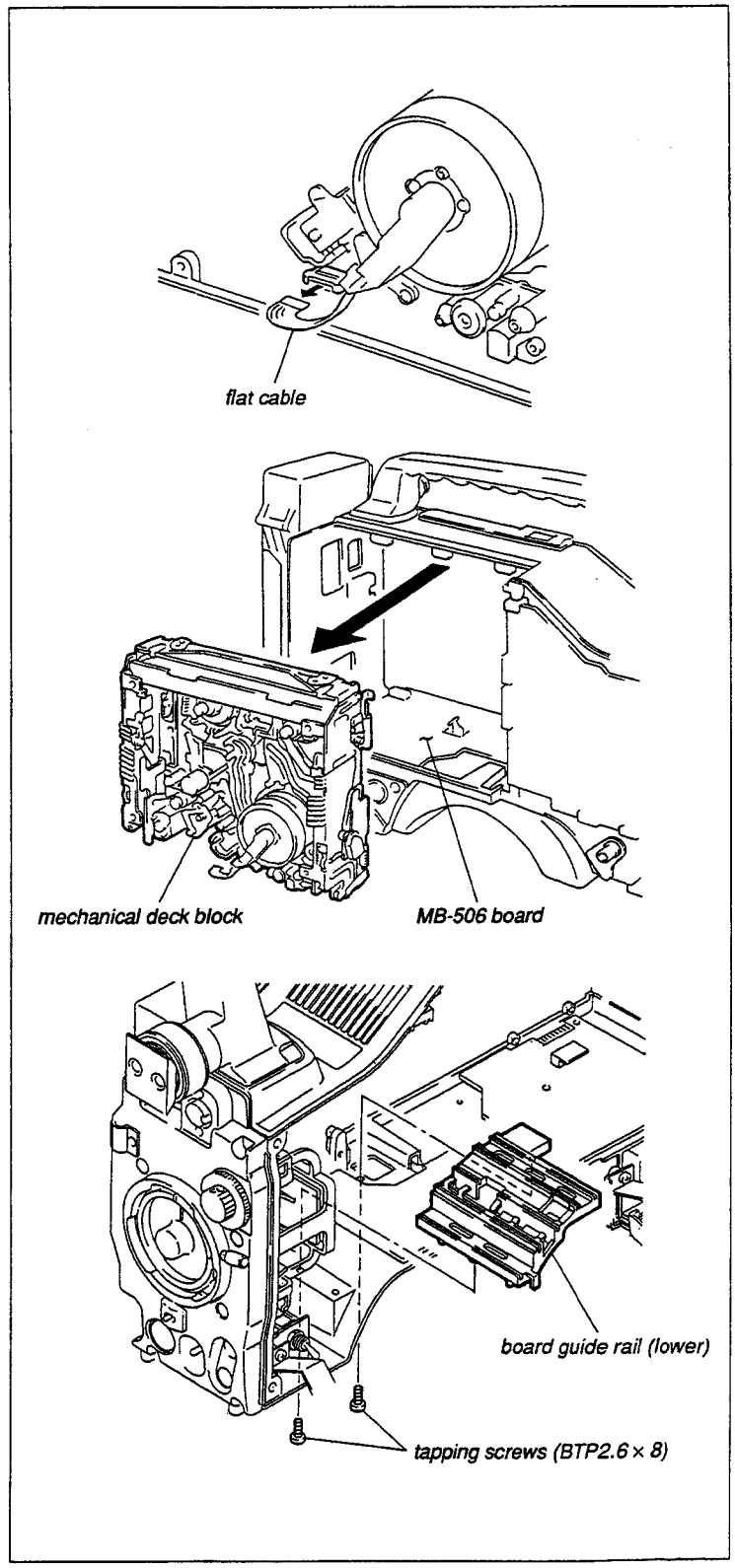
7. Install the cassette dummy cover (fixtures for service).



8. Loosen the four screws which secure the mechanical deck block to the unit by using hexagon bit (across flat has 1.5 mm).
(These screws are retained on the mechanical deck block, so they aren't out of it.)

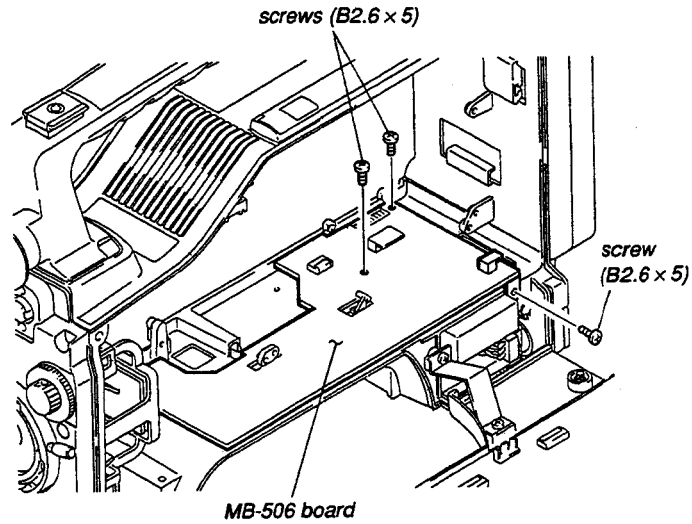


9. Disconnect the flat cable (CN28) of the MB-506 board, then remove the mechanical deck block.
10. Loosen two screws (B4 x 8), then remove the shoulder pad. (These screws are retained on the shoulder pad, so they aren't out of it.) (Refer to Section 2-9-1.)
11. Remove two screws (B2.6 x 5), then remove the CCZ plate. (Refer to Section 2-9-1.)

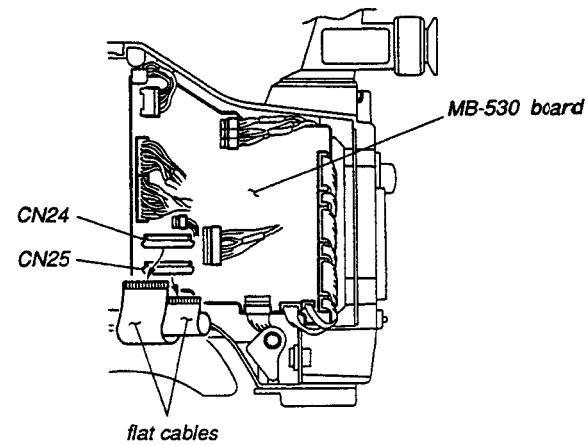


12. Remove the two tapping screws (BTP2.6 x 8), then remove a lower board guide rail.

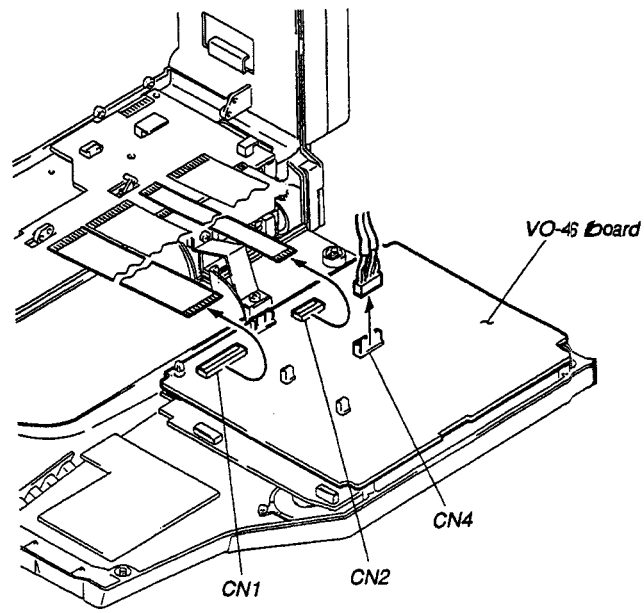
13. Remove three screws (B2.6 x 5) of the MB-506 board.



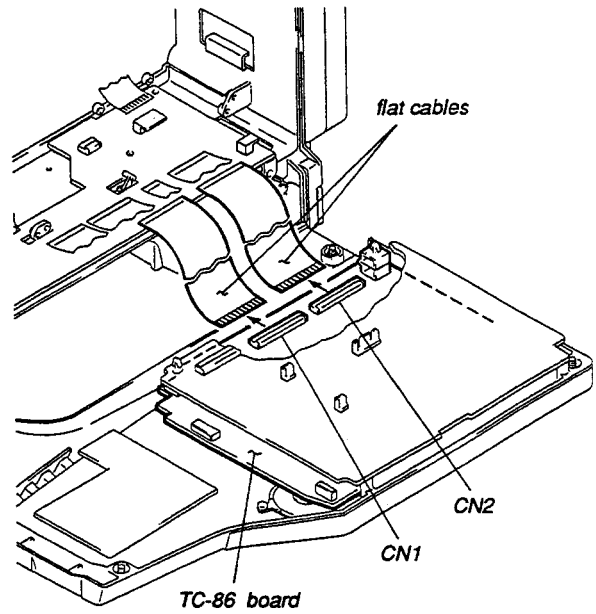
14. Disconnect the two flat cables (CN24, CN25) of the MB-530 board.



15. Disconnect the two flat cables (CN1, CN2) and the connector (CN4) of the VO-46 board.



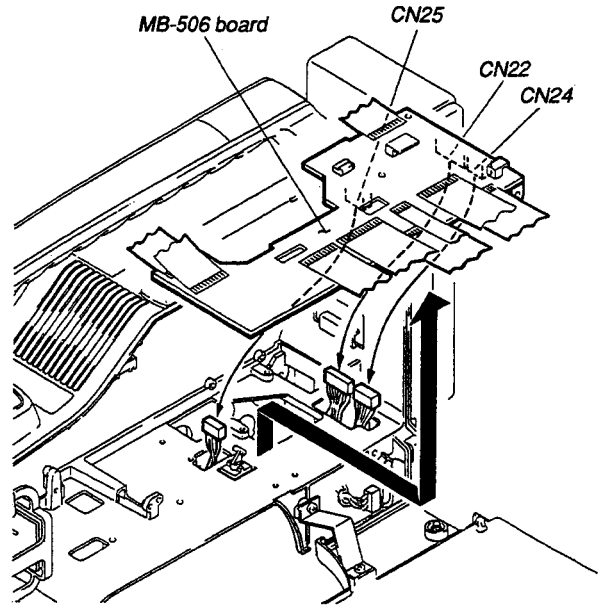
16. Disconnect the two flat cables (CN1, CN2) of the TC-86 board.



17. Remove the screw (B2.6 × 5), then remove the DD converter. (Refer to Section 2-9-1.)

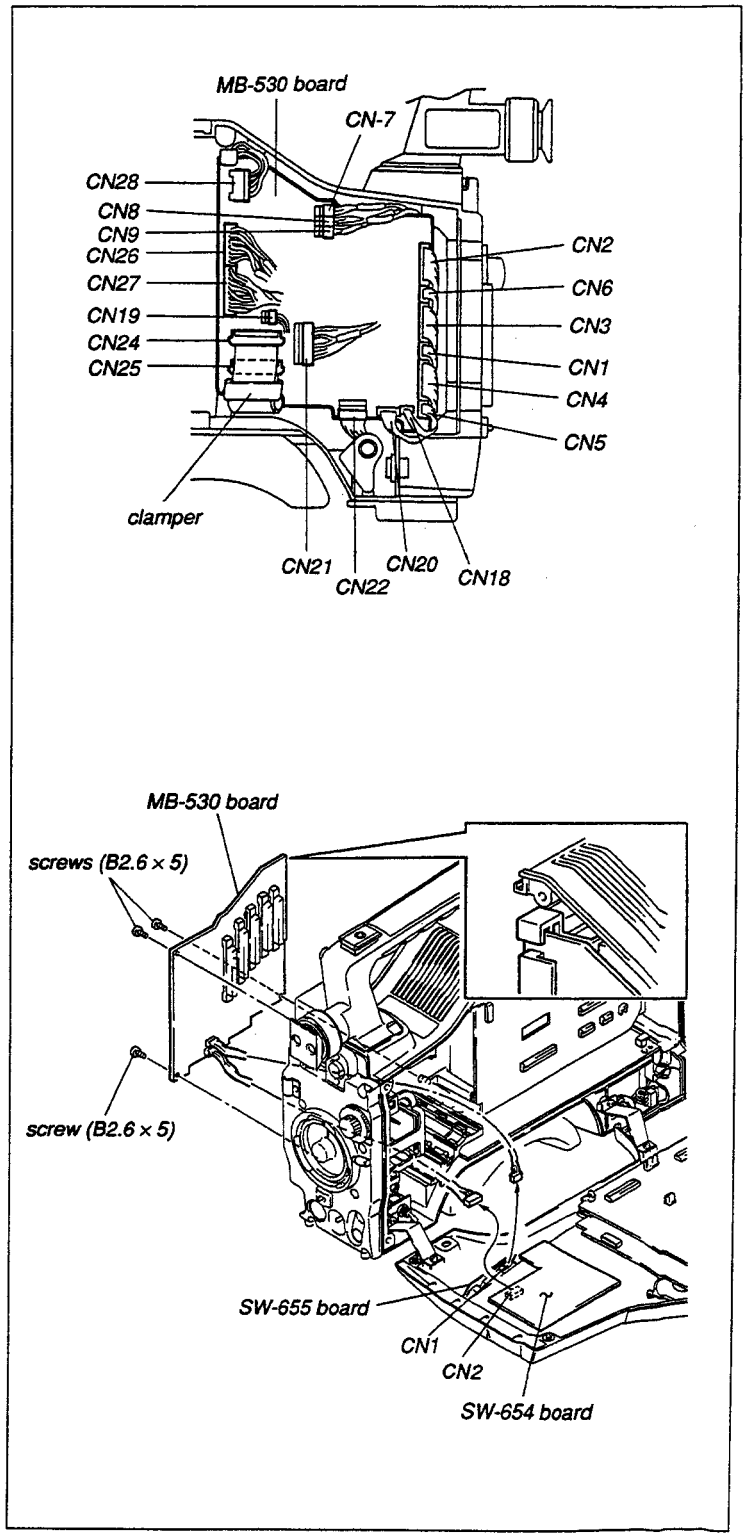
18. Remove the three screws (P2.6 × 5) and loosen the CN-935 board; then disconnect the connector (CN21) of the MB-506 board from the connector (CN1) of the CN-936 board. (Refer to Section 2-9-1.)

19. Disconnect the three connector (CN22, CN24, CN25) on the reverse side of the MB-506 board, then remove the board.



2-9-6. MB-530 board

1. Open the right side panel. (Refer to Section 2-1.)
2. Pull out the card boads. (Refer to Section 2-9-12.)
3. Open the left side panel. (Refer to Section 2-1.)
4. Disconnect the two flat cables (CN24,CN25) from the clamper of MB-530 board.
5. Disconnect the seventeen connector (CN1, CN2, CN3, CN4, CN5, CN6, CN7, CN8, CN9, CN18, CN19. CN20, CN21, CN22, CN26, CN27, CN28) of the MB-530 board.

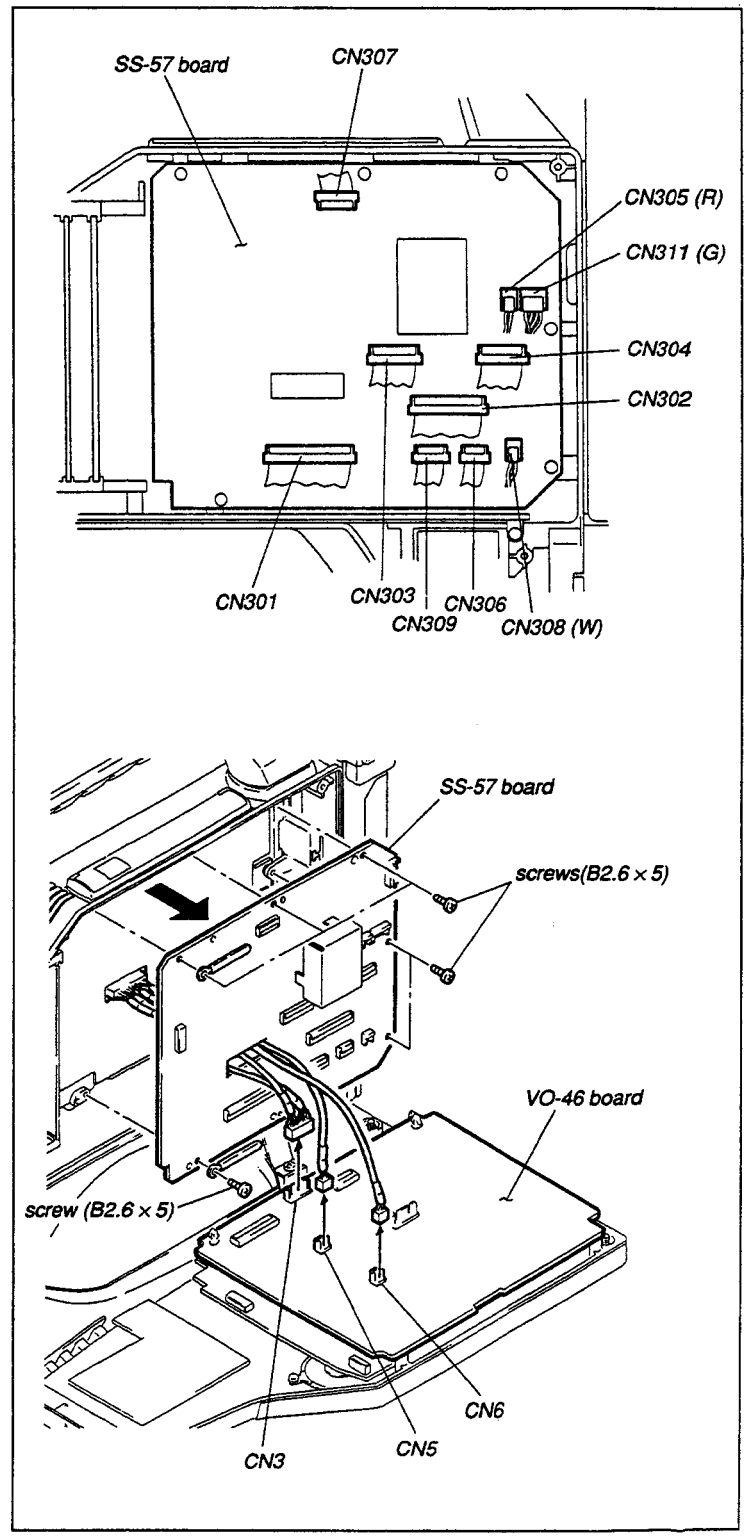


6. Remove three screws (B2.6×5), then pull out the board.
7. Disconnect the connector (CN1) of the SW-654 board and the connector (CN2) of the SW-655 board, then remove the board.

NOTE: Insert the board firmly in the ditch shown in thefigure, then install the screw.

2-9-7. SS-57 board

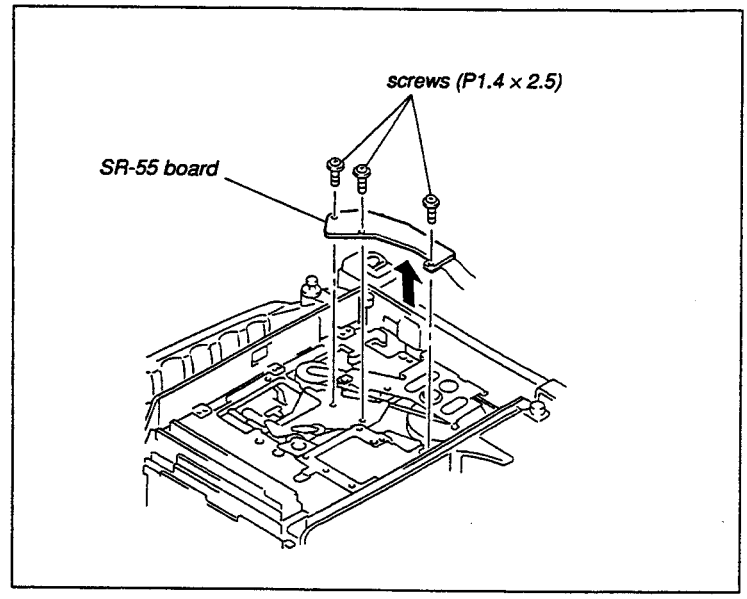
1. Open the right side panel. (Refer to Section 2-1.)
2. Disconnect the six flat cables (CN301, CN302, CN303, CN304, CN307, CN309) and the flexible card wire (CN306) of the SS-57 board.
3. Disconnect the three connector (CN305(R), CN308(W), CN311(G)) of the SS-57 board.



4. Remove six screws (B2.6 x 5) of the SS-57 board.
5. Disconnect the three connector (CN3, CN5, CN6) of the VO-46 board, then remove the board.

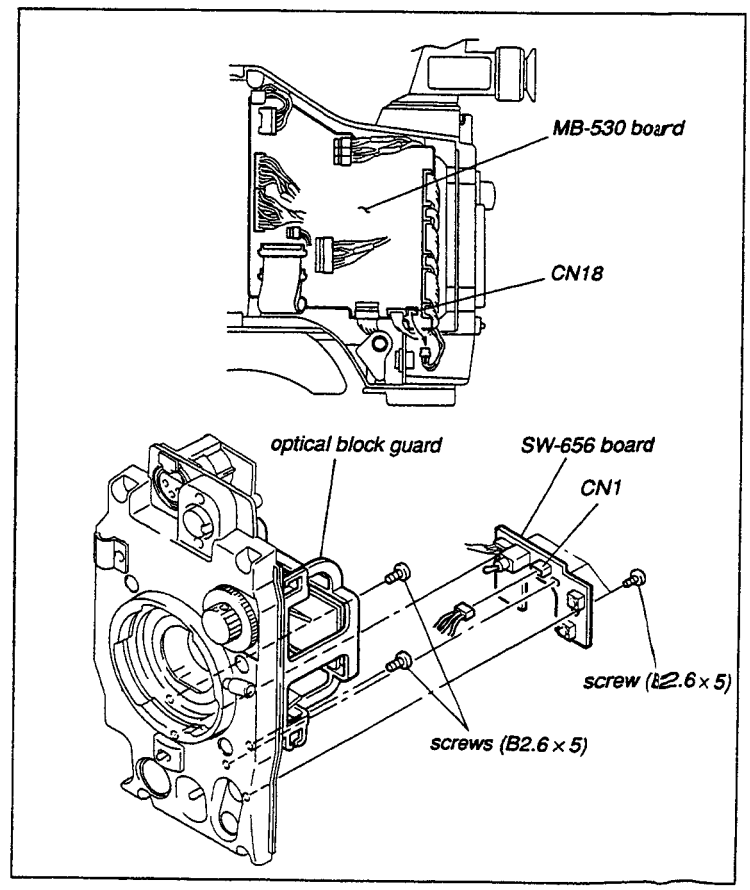
2-9-8. SR-55 board

1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the SS-57 board. (Refer to Section 2-9-7.)
3. Disconnect the connector (CN601) of the DR-254 board. (Refer to Section 2-9-3.)
4. Remove three washerhead screws (P1.4 × 2.5), then remove the board.



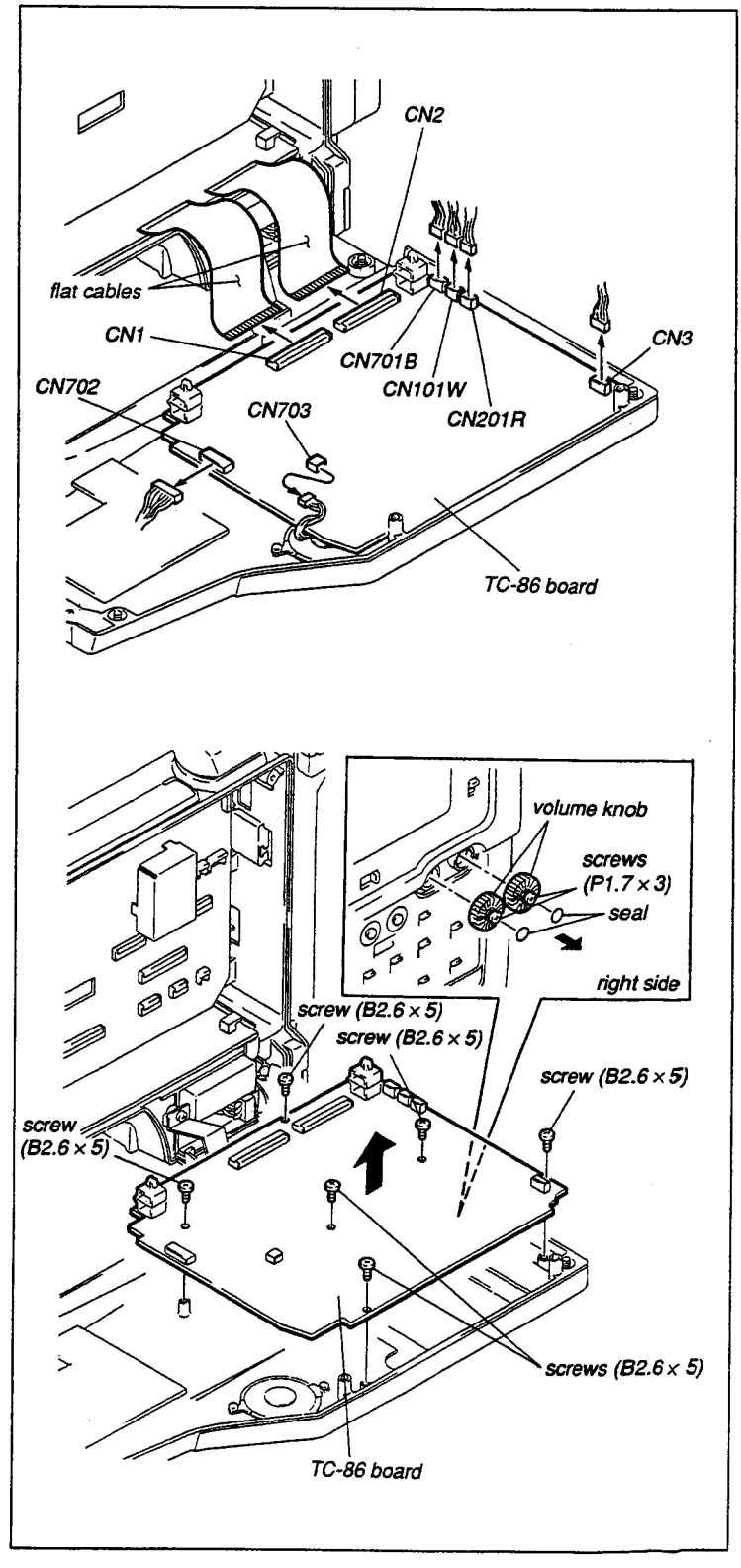
2-9-9. SW-656 board

1. Remove the left side panel and cassette-up compartment lid, and open the right side panel. (Refer to Section 2-1.)
2. Disconnect the connector (CN18) of the MB-530 board.
3. Remove the front unit Ass'y. (Refer to Section 4-2.)
4. Remove two screws (B2.6 × 5) of the optical block guard.
5. Remove three screws (B2.6 × 5) of the SW-656 board.
6. Disconnect the connector (CN1) of the SW-656 board, then remove the board.



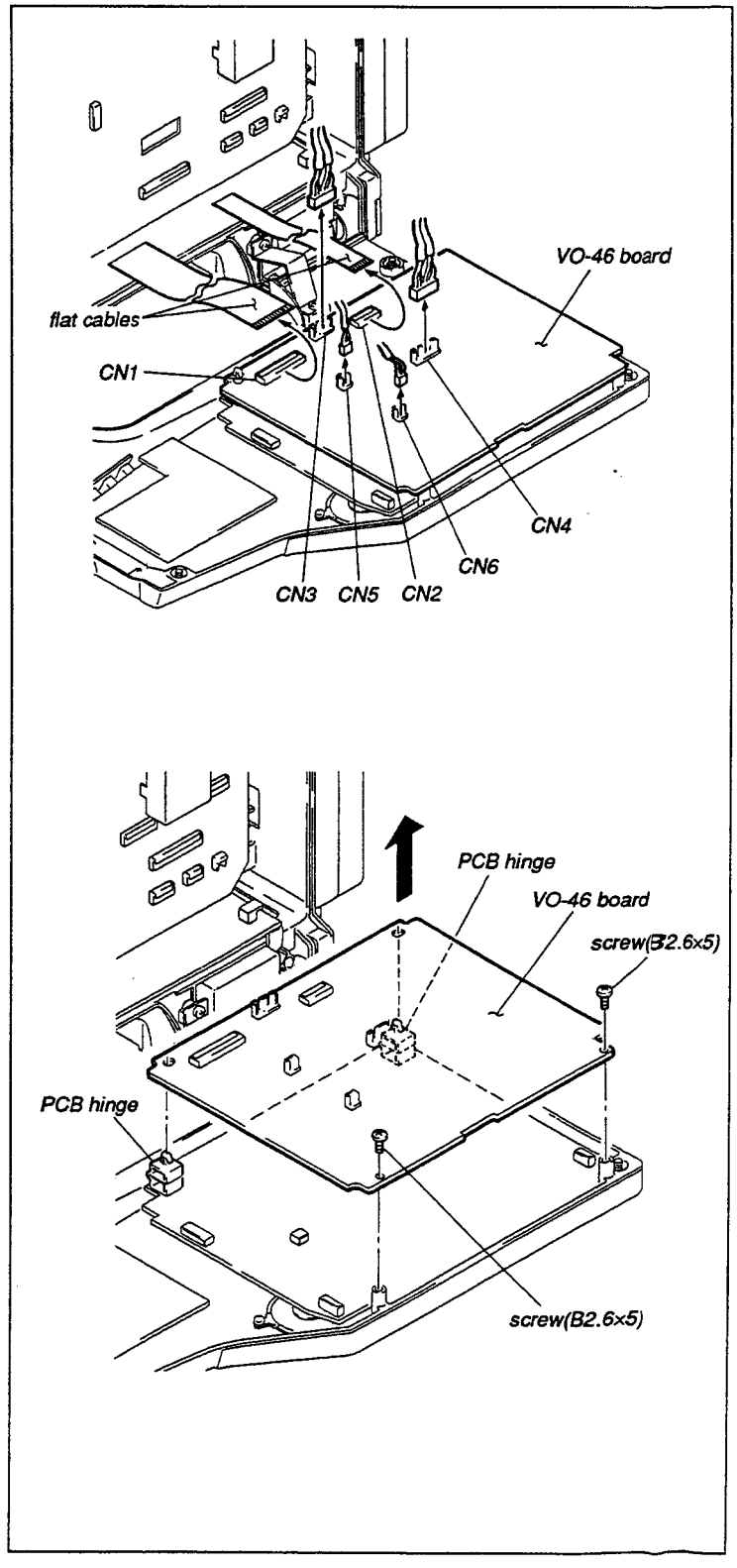
2-9-10. TC-86 board

1. Open the right side panel. (Refer to Section 2-1.)
2. Remove the VO-46 board. (Refer to Section 2-9-11.)
3. Disconnect the two flat cables (CN1, CN2) and the six connector (CN3, CN201R, CN101W, CN701B, CN702, CN703) of the TC-86 board.
4. Remove the black seal of the volume knob, then loosen each screws (P1.7 x 3) of the Audio Level volume (CH-1 and CH-2).
5. Remove six screws (B2.6 x 5) of the TC-86 board, then remove the board.



2-9-11. VO-46 board

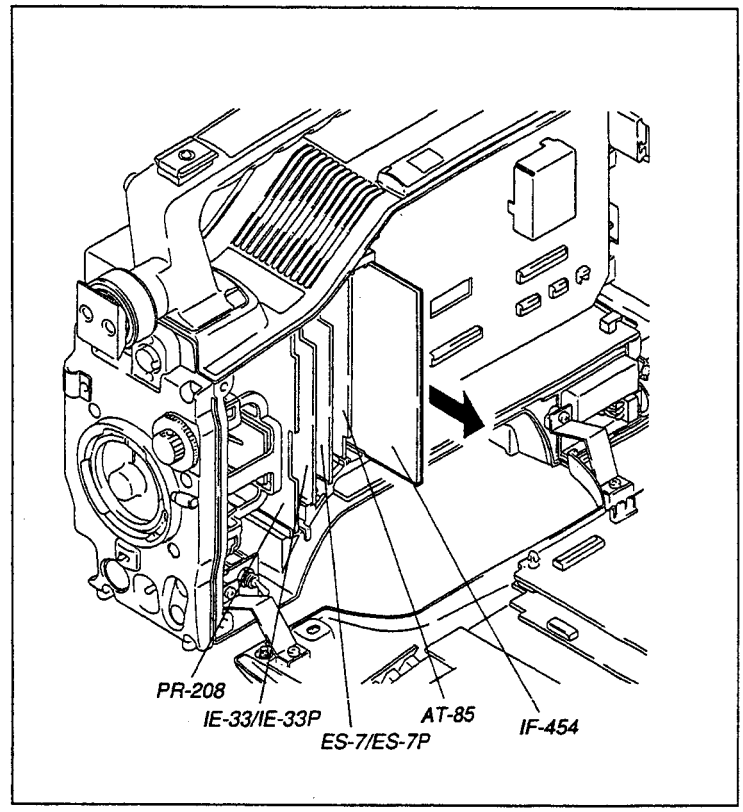
1. Open the right side panel. (Refer to Section 2-1.)
2. Disconnect the two flat cables (CN1, CN2) and the four connector (CN3, CN4, CN5, CN6) of the VO-46 board.
3. Remove two screws (B2.6 x 5) of the VO-46 board.
4. Remove the two PCB hinges shown in the figure, then remove the board.



2-9-12. Card boards (PR-208, IE-33/IE-33P, ES-7/ES-7P, AT-85, IF-454)

1. Open the right side panel. (Refer to Section 2-1.)
2. Grasp the board with the fingers, avoiding the components mounted on it, then pull it out while moving it gently up and down.

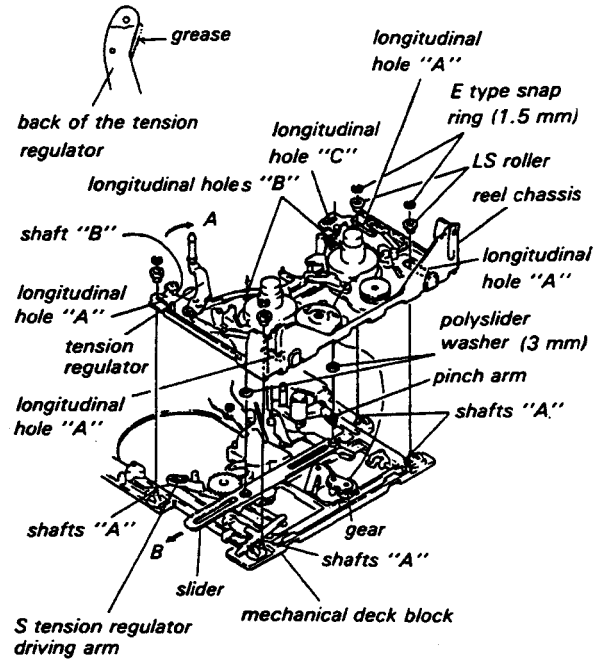
NOTE: Insert the board along the board guide rails, then push it firmly until it engages with the connector on the Mother board.

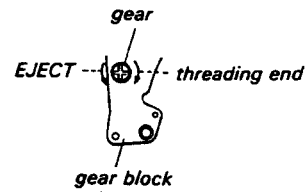


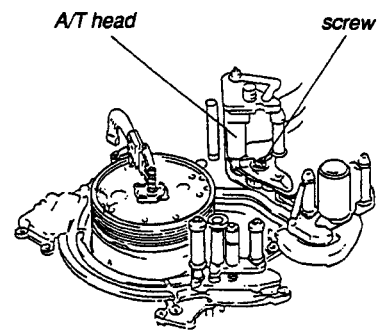
2-10. INSTALLATION OF THE REEL CHASSIS

Tool : Sony grease
Sony oil
Mode: EJECT
Installation procedure:

(1) Smear Sony grease on the back of the Tension Regulator of the Reel Chassis Assembly as shown in the figure.
(2) Gently push the Tension Regulator Arm in the direction of the arrow A.
(3) Apply a 1/4 drop of Sony oil on each of the four shafts "A" of the Mechanical Deck Block.
(4) Move the slider in the direction of the arrow B fully by hand.
(5) Insert 3mm diameter polyslider washers (0.5 mm thick) (3-701-439-21) onto the two shaft of the slider.
(6) Insert the Reel Chassis in the direction shown in the figure so that the gear is not contact with the reel chassis.
  (i) Insert the four shafts "A" of the Mechanical Deck Block into the four longitudinal holes "A" of Reel Chassis.
  (ii) Insert the two longitudinal holes "B" onto the two shafts of the Reel Chassis.
  (iii) Insert the longitudinal hole "C" of the Reel Chassis onto the Pinch Arm Roller.
  (iv) Insert the shaft "B" of the Reel Chassis into the longitudinal hole of the S Tension Regulator Driving Arm.
(7) Insert the LS Roller (3-723-007) onto the four shafts "A" of the Mechanical Deck Block as shown in the figure. Fasten with the E type stop ring (1.5 mm).
(8) Turn the screw on the front of the A/T Head by the screwdriver, and repeat threading and unthreading two or three times and check that they can be done smoothly.







2-11. REPLACEMENT OF FLAT CABLES/FLEXIBLE CARD WIRES

The following flat cables/flexible card wires are used on this unit.
Replace the flat cables or flexible card wires in the following procedures.

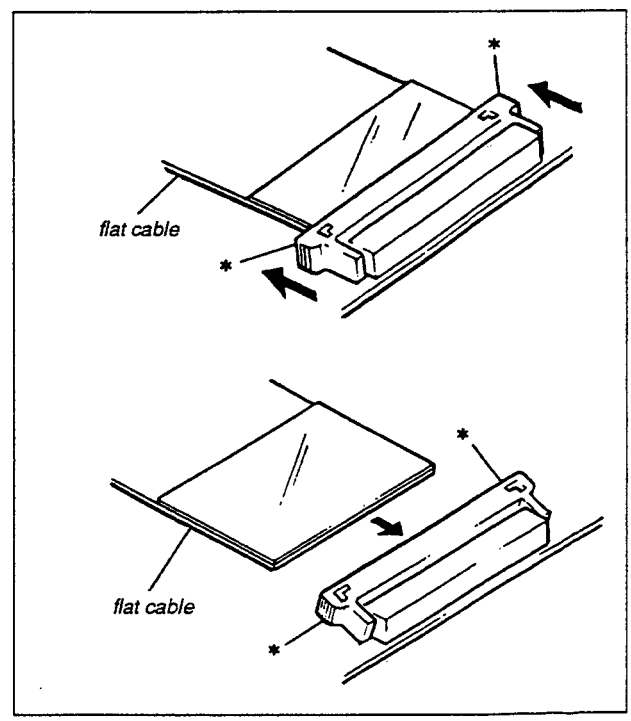
Connection	Number of Pin	Number of Flat Cable/ Flexible Card Wire
AU-185/185P Board~ MB-506 Board	24P	1
DR-254 Board~ SS-57/57A Board	16P	1
KY-285 Board~ SS-57/57A Board	10P	1
MB-506 Board~ MB-530/530P Board	24P	1
MB-506 Board~ MB-530/530P Board	24P	1
MB-506 Board~ SS-57/57A Board	30P	1

Connection	Number of Pin	Number of Flat Cable/ Flexible Card Wire
MB-506 Board~ SS-57/57A Board	26P	1
MB-506 Board~ TC-86/86A Board	30P	2
MB-506 Board~ VO-46/46A Board	24P	1
MB-506 Board~ VO-46/46A Board	10P	1
SS-57/57A Board~ cap motor	26P	1
SS-57/57A Board~ Function cam sensor	8P	1
A/T HEAD ~ AU-185 Board/ SS-57 Board	10P/5P	1

<Angle Type>
Disconnecting procedure
Slide the * marked portions of connector in the direction of the arrows, pull up the connector, and then disconnect the flat cable from the connector.

Installing procedure
Pull up the * marked portions of the connector, insert the flat cable on its contacting side is faced to the flat cable, and insert it as far as it will go untill the line indicated on the flat cable. Push down the * marked portions, then slide it in the direction of the arrow to lock.

NOTE: 1. Not install the flat cable on a slant.
2. Not short the terminal of the flat cable.



2-12. EXTENSION BOARD

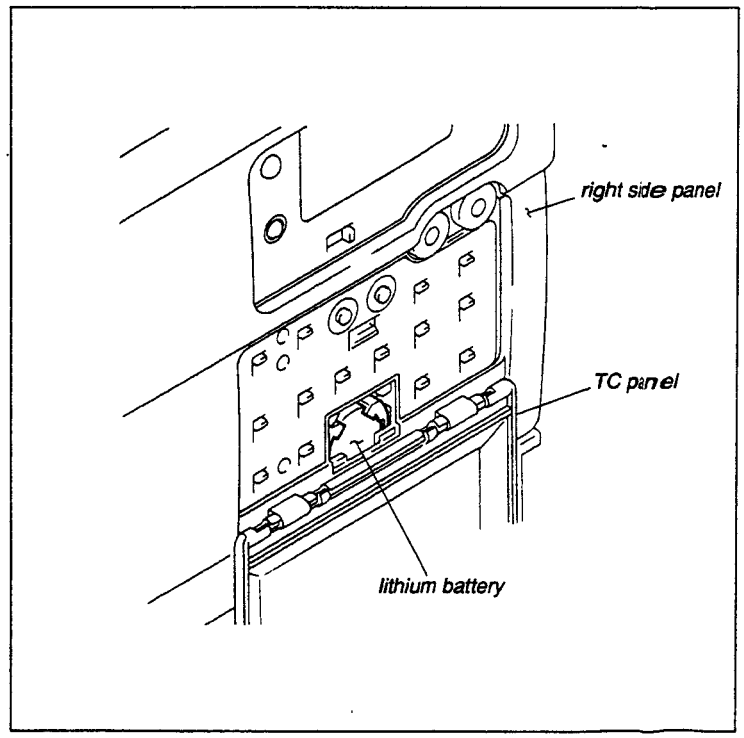
Two extension boards are supplied for check and adjustment of some printed circuit boards. Insert the extension board into the chassis of the unit and connect the circuit board to be checked or adjusted to the end of the extension board.

Extension board	Connectable Printed Circuit Boards
EX-337 SONY Parts No. J-6391-180-A	PR-208, IE-33/33P, ES-7/7P, AT-85, IF-454

2-13. NOTE ON REMOVING THE PRINTED CIRCUIT BOARDS

When the power switch is turned off, power of this unit is supplied in order to keep the time code data.
As to TC-86 board, keep the time code data by the lithium battery.
Replace the board when power is supplied, there is possibility of the damage of IC in the board.
Before removing the board, shut off the power as descrived in the following procedures.

1. Turn the power switch off.
2. Remove the lithium battery from the TC panel. (This applys to the removal of the TC-86 board only.)
3. Remove the battery.
4. Disconnect the cable from the EXT DC IN connector.



2-14. CONNECTOR INPUT/OUTPUT SIGNAL

INPUT

GENLOCK VIDEO IN : BNC Type
1.0 Vp-p, 75 Ω

TC IN : BNC Type
0.5~5 Vp-p,10 kΩ

OUTPUT

VIDEO OUT : BNC Type × 2
1.0 Vp-p, 75 Ω

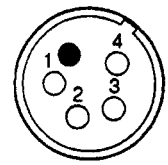
TC OUT : BNC Type × 2
1.0 Vp-p, 75 Ω

EAR : – ∞ ~ 20 dBu variable, 8 Ω
(STEREO MINI JACK)

REMOTE CONTROL TERMINAL

REMOTE : REC TRIGGER INPUT,
TALLY LAMP OUT PUT
(MINI JACK)

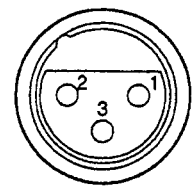
DC IN (4P, MALE)



(EXT VIEW)

Pin No.	Signal	Specification
1	EXT DC IN (G)	GND
2	———	———
3	———	———
4	EXT DC IN (X)	10.5 to 17.0 Vdc

MIC (3P, FEMALE)
CH–1/2(+48 dBu) (3P FEMALE)



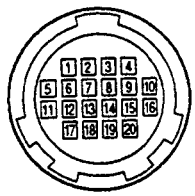
(EXT VIEW)

Pin No.	Signal	Specification
1	MIC IN (G)	GND
2	MIC IN (X)	MIC: –60 dBu Zi ≧ 3 kΩ BALANCED LINE: +4 dBu Zi ≧ 10 kΩ BALANCED
3	MIC IN (Y)	

CH–2/2 (+48 dBu)

Pin No.	Signal	Specification
1	CH–1/2 IN (G)	GND
2	CH–1/2 IN (X)	–60 dBu Zi ≧ 3 kΩ/+4 dBu BALANCED
3	CH–1/2 IN (Y)	

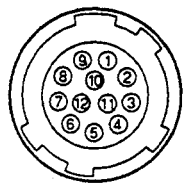
PB ADAPTOR CONNECTOR (20P, FEMALE)



(EXT VIEW)

Pin No.	Signal	VTR	Direction	PB Adator
1	Y-RF (X)	75 Ω 0.2 Vp-p (Center Carrier)		Z = 75 Ω
2	Y-RF (G)			
20	C-RF (X)	75 Ω 0.2 Vp-p (Center Carrier)		Z = 75 Ω
19	C-RF (G)			
3	AUDIO CH1 (X)	LOW Impedance −10 dBu		Z = 10 kΩ
5	AUDIO CH2 (X)			
4	AUDIO (G)			
16	Y SW PULSE (X)	1,3 CH : H 2,4 CH : L OPEN COLLECTOR		Z = 10 kΩ, Pull up +5 V
18	ADVANCE SYNC (X)	Z = 75 Ω		2 ± 0.5 Vp-p, 75 Ω
15	ADVANCE SYNC (G)			
6	CONTROL SIG. 1	METAL "H" FF/REW "M" H = 5.0 V M = 2.5 V		High impedance
17	CONTROL SIG. 2	PLAY : HIGH (> 6.5 V) Z = 10 kΩ		Z = 57 kΩ
9	VIDEO (X)	75 Ω 1 Vp-p		Z = 75 Ω
10	VIDEO (G)			
7	GND			
8	GND			
13	+12 V			
14	+12 V			
12	C SW PULSE (X)	1,3 CH : L 2,4 CH : H (0.3 V) EMITTER FOLLOWER (OPEN)		Z = 75 Ω
11	C SW PULSE (G)			

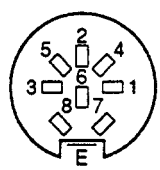
LENS (12P, FEMALE)



(EXT VIEW)

Pin No.	Signal	Specification
1	VF VIDEO CONT IN	ON : 0 ±0.5Vdc
2	VTR START/STOP IN	TRIG : 0 ±0.5V
3	POWER +12V DC GND	GND for +12Vdc
4	COMPULSORY AUTO IRIS CONT OUT	AUTO : 4.5 ±0.5V MANU: 0 +0.5V or OPEN
5	IRIS CONT OUT	F16 : 3.4Vdc F2.8 : 6.2Vdc
6	POWER +12V DC OUT	10.6V to 17.0Vdc
7	NC	
8	NC	
9	NC	
10	NC	
11	NC	
12	NC	

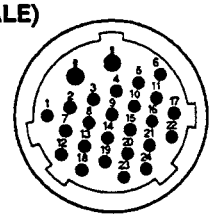
VF (8P, FEMALE)



(WIRING SIDE)

Pin No.	Signal	Specification
1	POWER +12V DE GND	GND for +12 Vdc
2	REC TALLY IND OUT	Zo≦ 1.1 kΩ
3	E. SHUTTER IND OUT	Zo≦ 1.1 kΩ
4	VF VIDEO (G) OUT	GND for VF VIDEO
5	BATT IND OUT	Zo≦ 1.1 kΩ
6	VF VIDEO (X) OUT	V ≦ 1 Vp-p
7	POWER +12V DC OUT	10.5 V to 17 Vdc, 3 A
8	GAIN UP IND OUT	Zo≦ 1.1 kΩ

EXT VTR (26P, MALE)



(EXT VIEW)

No.	Signal	Specification
A	EXT DC (CCZ) IN (X)	Sensing for Power Save Circuit (IF-454)
B	EXT DC IN (G)	—
1	EN/Y VIDEO OUT (X)	VBS = 1.0 Vp-p ± 1 dB (100%) Zo = 75 W ± 5% DC = 0 ± 100 mV
2	EN/CF/CHROMA (G)	GND for ADP VIDEO
3	Y/OUT (G)	GND for Y
4	Y/OUT (X)	VS = 1.0 Vp-p ± 0.5 dB (100%) Zo = 75 W ± 5% DC = 0 ± 200 mV
5	R-Y OUT (X)	VS = 700 mVp-p [for UC model] ± 2% 525 mVp-p [for EK model] ± 2% (75% COLOR BARS) Zo = 75 W ± 5% DC = 0 ± 200 mV
6	R-Y OUT (G)	GND for R-Y
7	B-Y OUT (X)	VS = 700 mVp-p [for UC model] ± 2% 525 mVp-p [for EK model] ± 2% (75% COLOR BARS) Zo = 75 W ± 5% DC = 0 ± 200 mV
8	B-Y OUT (G)	GND for B-Y
9	MIC OUT (X)	–60 dBm/–20 dBm Zo 600 W BALANCED
10	MIC OUT (Y)	
11	MIC OUT (G)	GND for MIC
12	VTR START/STOP OUT TALLY OUT	START: 4.5 ± 0.5 V STOP: 0 ± 0.5 V Zo 10 W
13	BATT IND IN/S DATE	Zi = 300 W (Note. 1)
14	NC	—
15	REC ALARM IN	Zi = 20 kW (Note. 2)
16	NC	—
17	AUDIO MONITOR IN (G)	—
18	RET/PB VIDEO IN (X)	Zi = 75 W ± 5% VS = 1.0 Vp-p ± 1% (100%) DC = 0 ± 200 mV
19	RET/PB VIDEO IN (G)	GND for PB VIDEO
20	AUDIO MONITOR IN (X)	Zi =750 W (1 kHz) SAVE: 4.5 ± 0.5 V STANBY: 9.0 + 1.0 V 0.5 V Zo = 10 kW
21	NC	—
22	CF/CHROMA OUT (X)	5.0 ± 1.0 Vp-p (CF)
		286 mVp-p (BURST) [for UC model] 300 mVp-p (BURST) [for EK model] (BURST) (CHROMA) Zo = 1 kW ± 5% (CF) 75 W (CHROMA) DC block
23	NC	—
24	NC	—

• VTR Connected (Selecting by EXT VTR output switch)

	1	2
	AUTO	AUTO
1	EN VIDEO OUT (X)	*1 Y OUT (X)
2	EN VIDEO/CF OUT (G)	Y/CHROMA OUT (G)
3	Y OUT (G)	——
4	*2 Y OUT (X)	——
5	R-Y OUT (X)	——
6	R-Y OUT (G)	——
7	B-Y OUT (X)	——
8	B-Y OUT (G)	——
22	CF OUT (X)	CHROMA OUT (X)

*1 Y/C
*2 CONPONENT

Note 1: 13 pin (BATT IND IN/S DATE)

The EXT VTR connected to the EXT VTR Connector (CCZ 26 pin) has a battery voltage detection circuit and warning signal output circuit. The circuit informs the camera of the battery voltage drop by sending the following signal to pin 13. The camera uses the LED on the viewfinder to warn the user the condition.

VTR Battery voltage	more than 11.1Vdc	10.8 to 11.1Vdc	less than 10.8Vdc
Spec.	2.5 ± 0.5V 0 ± 0.5V	1 ± 0.2Hz or 4 ± 0.8H (duty 50 ± 1 %)	
LED in Viewfinder	Goes out	Blinks	Lights

Note 2: Pin 15 (REC ALARM IN)

This signal indicates the operating status of VTR is inputted. The specifications of the signal is shown below.

Spec.	1 ± 0.2Hz or 4 ± 0.8Hz (duty 50 ± 1 %) 5.0 ± 1.0V 2.5 ± 0.5V 0 ± 0.3V
VTR Operation	VTR POWER "OFF" / VTR POWER "ON" / VTR ALARM / VTR RECORD / REC RESET 10 to 100ms VTR ALARM : When an abnormality is detected in VTR. When the VTR has started recording. VTR RECORD : When the VTR is recording. VTR RESET : When the recording is stopped from VTR side.

2-15. APPLICABLE CONNECTOR

When external cables are connected to the various connectors on the connector panel during maintenance, the hardware listed below (or equivalents) must be used.

Panel indication	Applicable connector
AUDIO IN	1-508-084-00 CONNECTOR, XLR, 3P, MALE
DC IN	1-508-362-00 PLUG, XLR, 4P, FEMALE
TC IN/OUT	1-560-069-11 PLUG, BNC, MALE
GENLOCK VIDEO IN	1-560-069-11 PLUG, BNC, MALE
VIDEO OUT	1-560-069-11 PLUG, BNC, MALE
PB ADAPTOR	1-566-771-11 PLUG, 20P, MALE
MIC IN (FRONT)	1-508-084-00 CONNECTOR, XLR, 3P, MALE
EARPHONE	JACK, MINI
REMOTE	JACK, MINI
EXT VTR	1-564-184-21 PLUG, CONNECTOR (SOCKET) 26P, FEMALE • For 14P-VTR use CCZQ-A2 (2 m) CCZQ-A5 (5 m) CCZQ-A10 (10 m) • For 26P-VTR CCZ-A2 (2 m) CCZ-A5 (5 m) CCZ-A10 (10 m)

2-16. BOARD SWITCH SETTINGS

2-16-1. ES-7/ES-7P board

• S1 (VTR TEST)

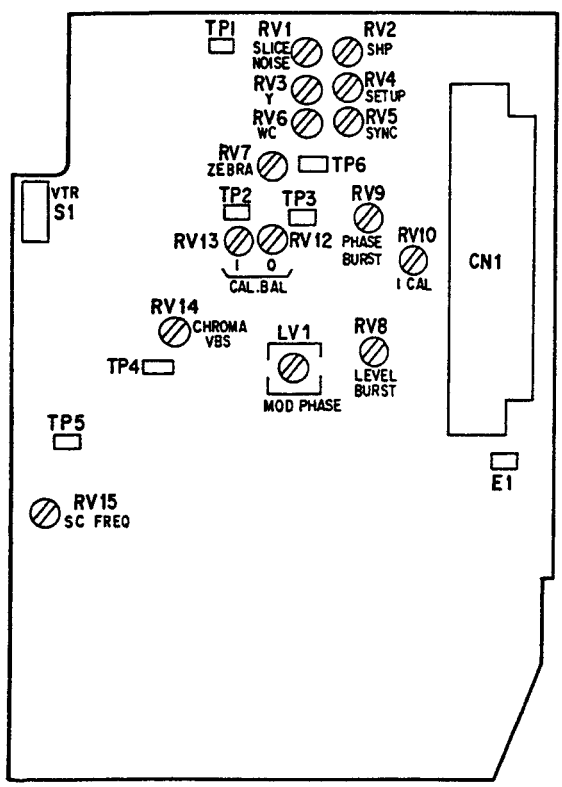
Not used
Normally set to upper side.
(A correct recording cannot be made when the switch is set to lower side.)

2-16-2. IE-33/IE-33P board

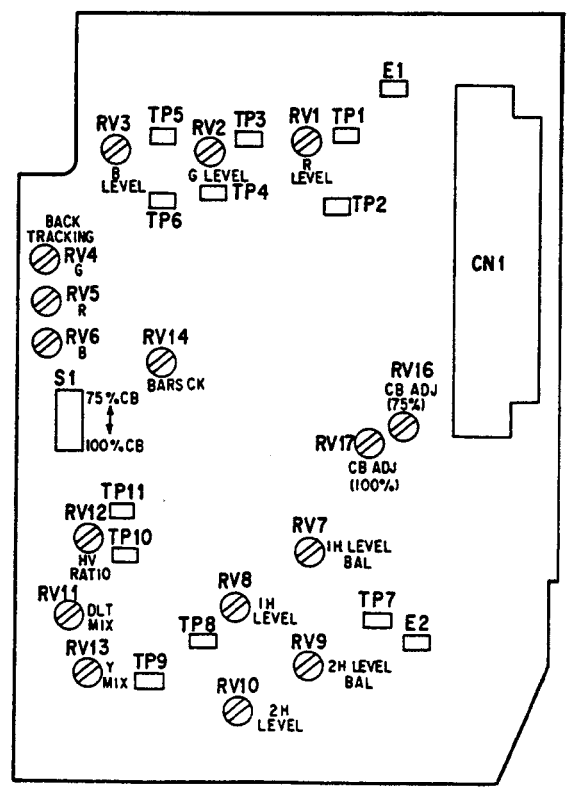
• S1 (75% CB/100% CB) (NTSC only)

Up: White level 77% color bar signals are output.
Down: White level 100% color signals are output.

The factory setting is 75% CB (up position).



ES-7/ES-7P BOARD (COMPONENT)



IE-33/IE-33P BOARD (COMPONENT SIDE)

2-16-3. AT-85 board

• S1 (FRAME RESET/FIELD)

The CCD readout method can be set to either frame reset readout (EVS) or field readout.
The factory setting is FLD (up position).

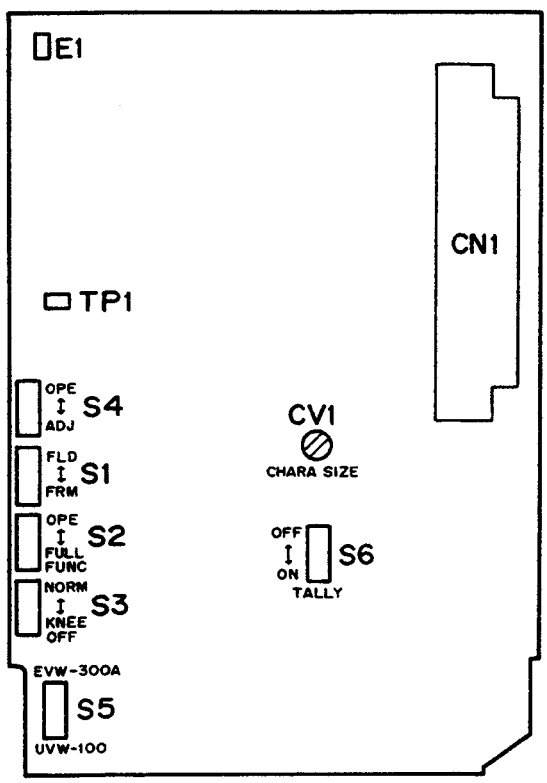
• S2 (FULL FUNCTION/OPE)

Up (OPE): Normal mode
Down (FULL FUNCTION):
In addition to the normal mode, the following modes can be varied.

- Control setting of the video system (* 1)
- Auto iris setting (* 2)
- Gain, clear scan setting (* 3)
- AGC, AE speed select setting (* 4)

By setting this switch to the [FULL FUNC] side in the case of an AUTO WHITE or AUTO BLACK error, the details of the error can be seen. (* 5)

The factory setting is OPE (up position).

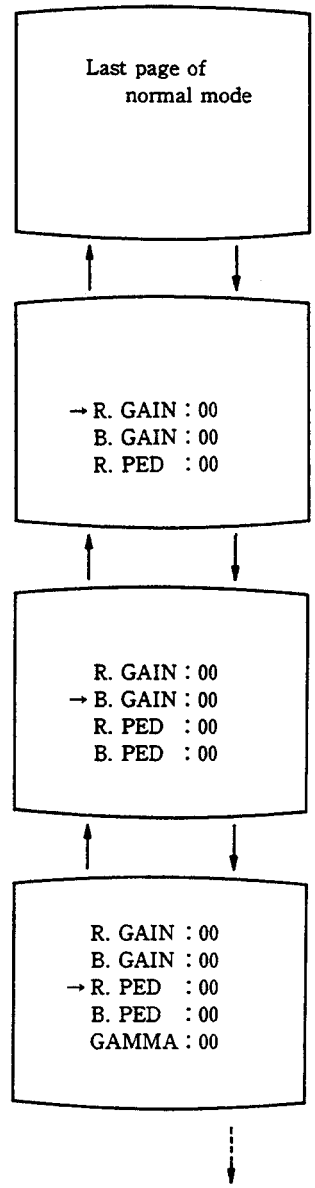


AT-85 BOARD (COMPONENT SIDE)

* 1 Changing the control setting mode of the video system

1) Set S4 of the AT-85 board to [OPE] (up position), and S2 to [FULL FUNC] (down position).
2) By setting the [DISP CHG] switch on the side of the unit, the following screen will be displayed on the VF screen after the normal control mode.

↓ : Push down the [DISP CHG] switch.
↑ : Push up the [DISP CHG] switch.



(To the auto iris setting mode)

From this screen, the control voltage corresponding to the item indicated by the flashing arrow [→] can be varied using the [UP] or [DOWN] switch on the front of the unit.

Standard setting : 00
Variable range : 0 V~2.5 V~5.0 V
(display −99~00~99)

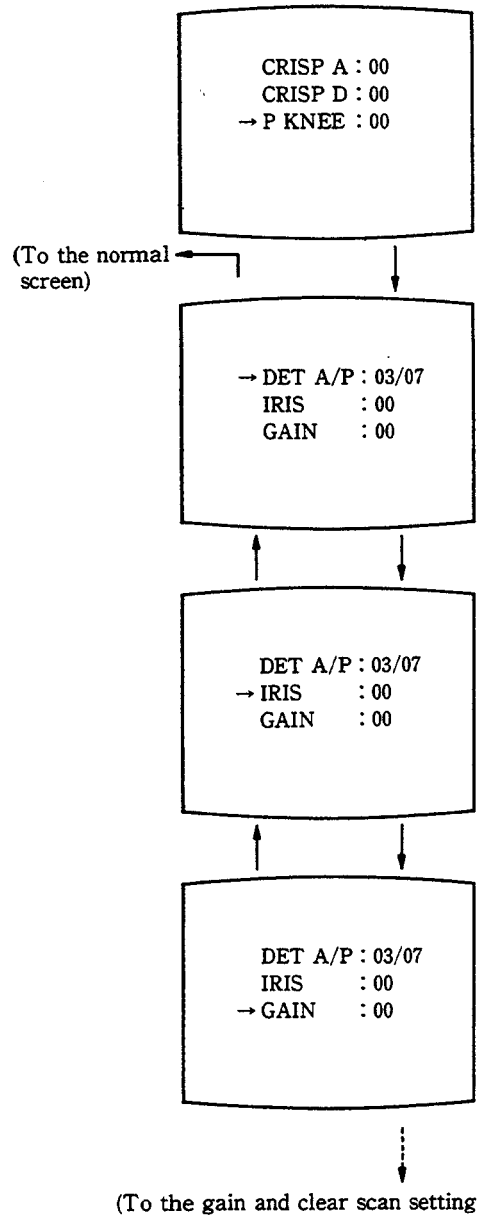
Display	Control item	Voltage change point	Memory	Renewal of set data
R GAIN	R gain	PR-208 board ; pin 7 of IC13	× Canceling control with the [W.BAL] switch	The data will be renewed in the AUTO WHITE mode.
B GAIN	B gain	PR-208 board ; pin 5 of IC13	×	
R PED	R pedstal	PR-208 board ; pin 8 of IC13	○	The data will be renewed in the AUTO BLACK mode.
B PED	B pedstal	PR-208 board ; pin 12 of IC13	○	
GAMMA	gamma	PR-208 board ; pin 2 of IC13	○	
KNEE	knee point	PR-208 board ; pin 3 of IC13	○	
W. CLIP	white clip	PR-208 board ; pin 4 of IC13	○	
CRISP A	aperture crispening	AT-85 pin 3 of IC13	○	
CRISP D	detail crispening	PR-208 board ; pin 19 of IC13	× Canceling control with the [GAIN] switch	The data will be renewed with the [GAIN] switch.
P KNEE	pre-knee point	PR-208 board ; pin 6 of IC13	○	

Return to the standard setting of 00 after changing the control voltage.

* 2 Changing the auto iris setting mode

↓ : Press down the [DISP CHG] switch.
↑ : Press up the [DISP CHG] switch.

Change the data with the [UP] switch or the [DOWN] switch.



Last page of the video system control mode

The AVERAGE/PEAK ratio of the AUTO IRIS, AGC and AE level detection can be changed.

Standard setting : 03/07

Setting of AUTO IRIS, AGC and AE convergence level

AUTO IRIS loop gain setting

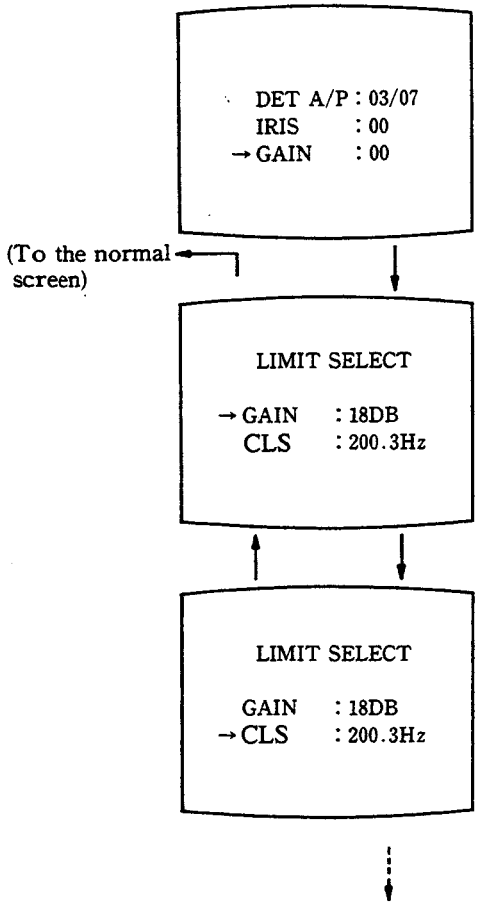
Standard setting : 00

Note : If the gain is increased excessively, the iris may hunt when a bright subject is shot.

* 3 Changing the gain and clear scan setting modes

↓ : Press down the [DISP CHG] switch.
↑ : Press up the [DISP CHG] switch.

Change the data with the [UP] switch or the [DOWN] switch.



(To the AGC and AE speed select modes)

Last page of the auto iris setting mode

The upper limit of the gain which can be set with the [GAIN] switch on the side of the unit can be varied.

Variable range : 2 dB to 24 dB (1 dB steps)

Standard setting : 18 dB

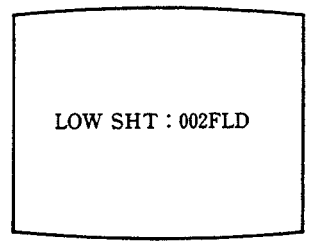
The upper limit of the frequency which can be set using a clear scan function can be varied.

Variable range : 59.9 to 10169 Hz

Standard setting : 200.3 Hz

Variable range: 59.9 to 10169 Hz (UVW-100)
50.0 to 10040 Hz (UVW-100P)
Standard Setting: 200.3 Hz (UVW-100)
201.5 Hz (UVW-100P)
(Clear scan setting value shown in the figure is for the UVW-100. 201.5 Hz will be displayed for the UVW-100P.)

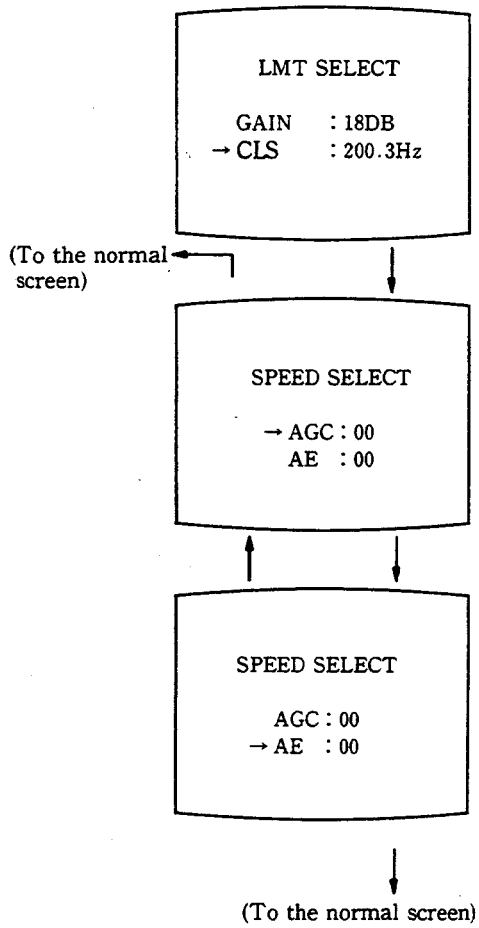
- You can enter the low speed shutter mode by pressing the [UP] switch while the screen shown at left is displayed.



Variable range : 002FLD to 510FLD
(2FLD steps)

* 4 Changing the AGC and AE speed select setting modes

↓ : Press down the [DISP CHG] switch.
↑ : Press up the [DISP CHG] switch.



Last page of the gain and clear scan setting modes

(Clear scan setting value shown in the figure is for the UVW-100.)

AGC speed (loop gain) setting
By increasing the value, the loop gain will rise.

Variable range : −99∼00∼99

Standard setting : 00

AE speed (loop gain) setting
By increasing the value, the loop gain will rise.

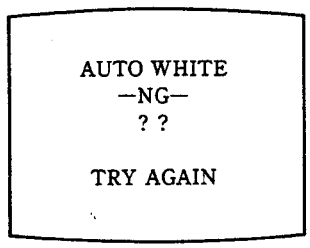
Variable range : −99∼00∼99

Standard setting : 00

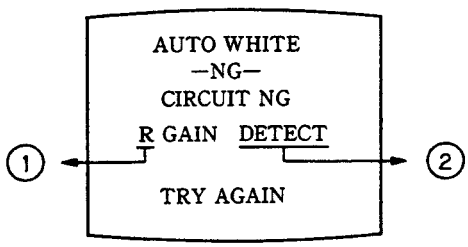
Note : If the loop gain of AGC and AE is increased excessively, the AGC may hunt when a bright subject is shot.

* 5 AUTO WHITE and AUTO BLACK error messages

• AUTO WHITE error message



S2/AT-85 → FULL FUNC position

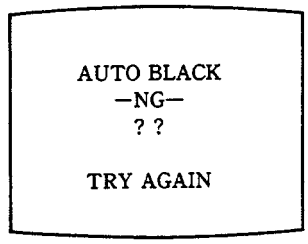


Error display when there is a defect in the circuit (normal mode)

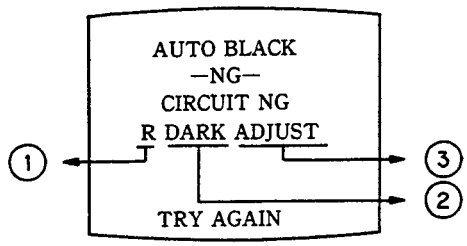
① R : R-ch error
B : B-ch error
G-G : G-G reference voltage A/D error

② CONTROL : Control circuit error
(Microprocessor → D/A converter → Each video circuit)
DETECT : Detection circuit error
(PR output → Detection circuit in AT board → Microprocessor)

• AUTO BLACK error message



S2/AT-85 → FULL FUNC position



Error message when there is a defect in the circuit (normal mode)

① R : R-ch error
G : G-ch error
B : B-ch error
G-G : G-G reference voltage A/D error

② DARK : DARK CONT (black tracking) error
PED : PED CONT (black balance) error

③ ADJUST : Outside the adjustment range
CONTROL : Control circuit error
(Microprocessor → D/A converter → Each video circuit)
DETECT : Detection circuit error
(PR output → Detection circuit in AT board → Microprocessor)

Note: Return S2/AT-85 to OPE position after using this mode.

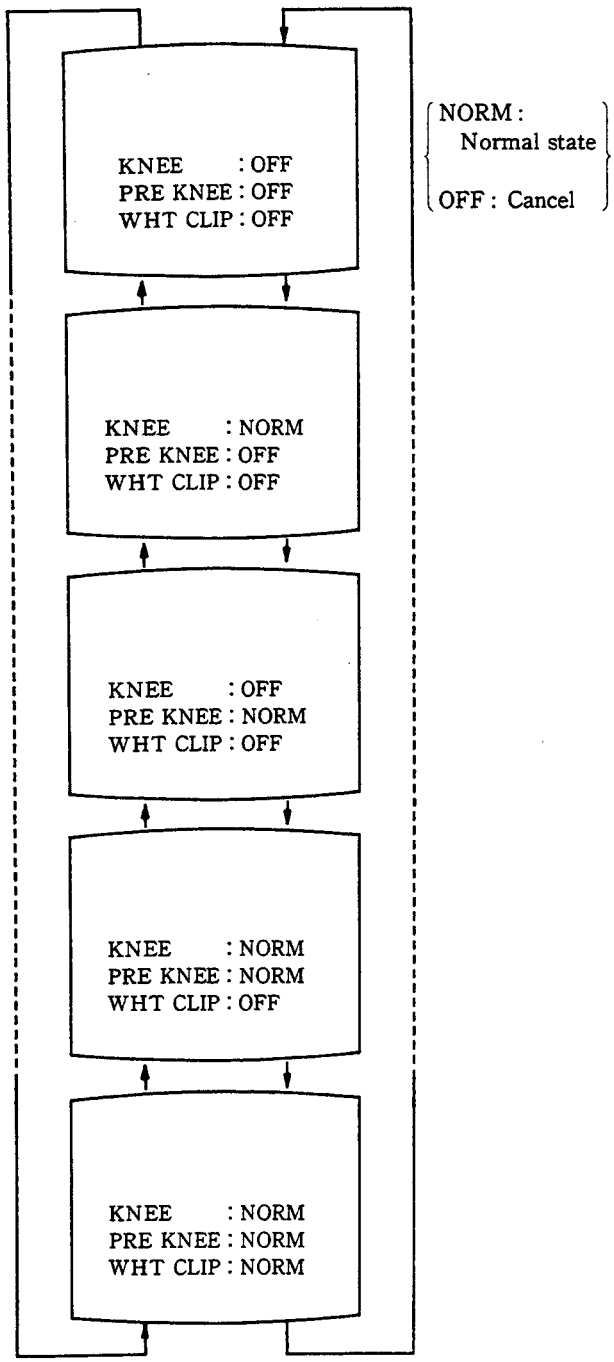
● S3 (OPE ↔ KNEE HI)

Up (OPE) : Normal mode
Down (KNEE HI) : Mode which clears the KNEE, PRE KNEE and WHITE CLIP in the ADJ MODE

The factory setting is OPE (up position).

1) Set S4 on the AT-85 board to ADJ (bottom position), and S3 to KNEE HI (bottom position).
2) Cancel KNEE, PRE KNEE and WHITE CLIP using the [UP] switch or the [DOWN] switch.

↓ : Press the [UP] switch.
↑ : Press the [DOWN] switch.



● S4 (ADJ/OPE)

Up (OPE) : Normal mode
Down (ADJ) : Control data of the following items is preset.

R/B GAIN,
R/B PEDESTAL,
MASTER PEDESTAL,
DETAIL

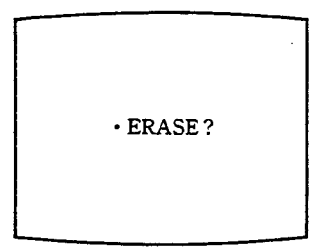
The memory data can be cleared by using this switch (* 6).

The factory setting is OPE (up position).

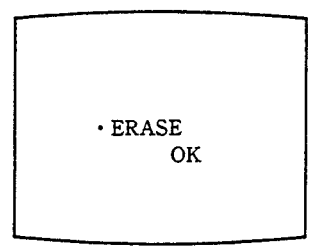
* 6 The following data memorized in the unit can be changed back to the factory settings.

- AUTO WHITE data
- AUTO BLACK data
- The following data set using the [UP]/[DOWN] switch
  AUTO IRIS OVERRIDE
  DETAIL
  MASTER PEDESTAL
  SHUTTER, CLEAR SCAN
  AE ON/OFF
  LOW LIGHT IND ON/OFF
  AUTO IRIS mode
  SHUTTER display mode
  GAIN UP switch select
  Changeover point between AGC • AE and AUTO IRIS

1) Set S4 on the AT-85 board to ADJ (bottom position).
2) Press down the [DISP CHG] switch.



3) By pressing the [UP] switch, the entire contents of the memory will be erased.



4) Finally, be sure to return S4 on the AT-85 board to OPE (up position).

- S5 (EVW-300A/UVW-100)

  Set the S5 switch to UVW-100.

- S6 (TALLY ON/OFF)

[ON]
TALLY lamp or indicator of the unit on VF lights on or blinks according to the operation of an external VTR or an internal VTR.

[OFF]
TALLY is operatedin the internal VTR only.

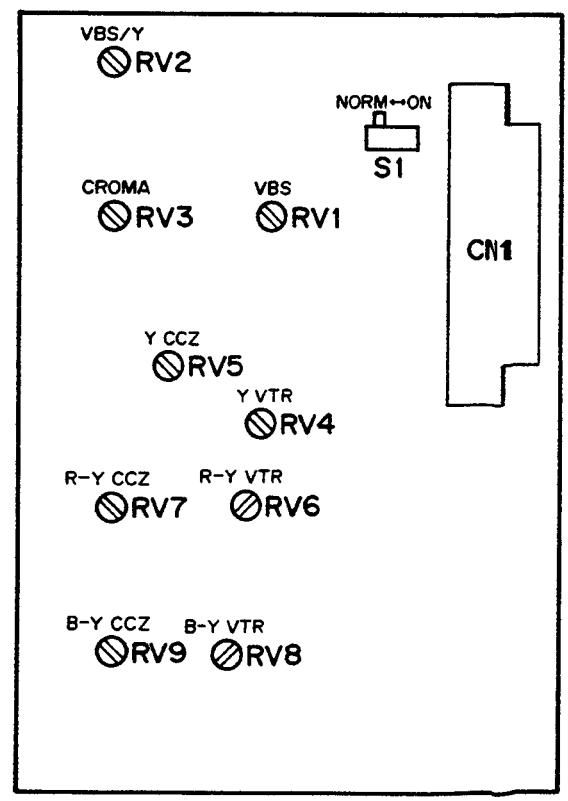
The factory setting is ON.

2-16-4. IF-454 Board

- S1 (POWER SAVE ON/OFF)

[NORM]
When an external VTR is connected to EXT VTR connector (26-pin) on the rear panel and the power of the external VTR turns ON, IF-454 circuit operates.
(This function is called as power saving function.)
The factory setting and normal setting is NORM.

[ON]
IF-454 circuit operates whether EXT VTR connector (26-pin) is connected or not.



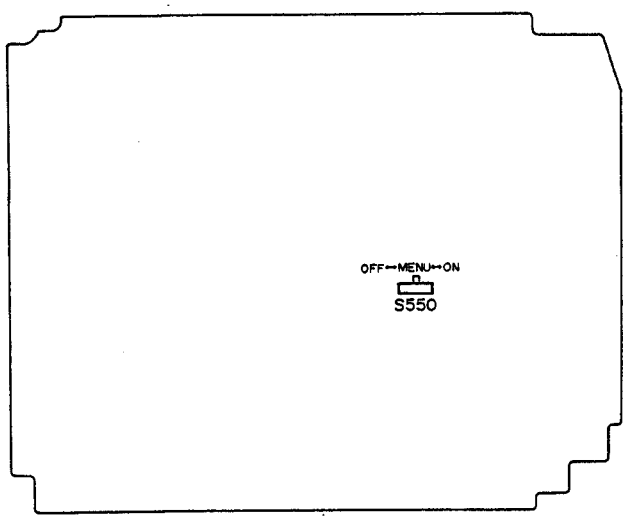
IF-454 BOARD (COMPONENT SIDE)

2-16-5. TC-86/TC-86A Board

- S550 (DOLBY, OFF ⇔ MENU ⇔ ON)

  When this switch is set to MENU, the unit is entered to the SYSTEM MENU (menu No. 303), then selecting of this switch can be performed.
  (refer to section 2-22 for the operation of MENU.)

  The factory setting is MENU.



TC-86/TC-86A BOARD (COMPONENT SIDE)

2-17. ATTACHMENT OF THE DXF-40B/50B

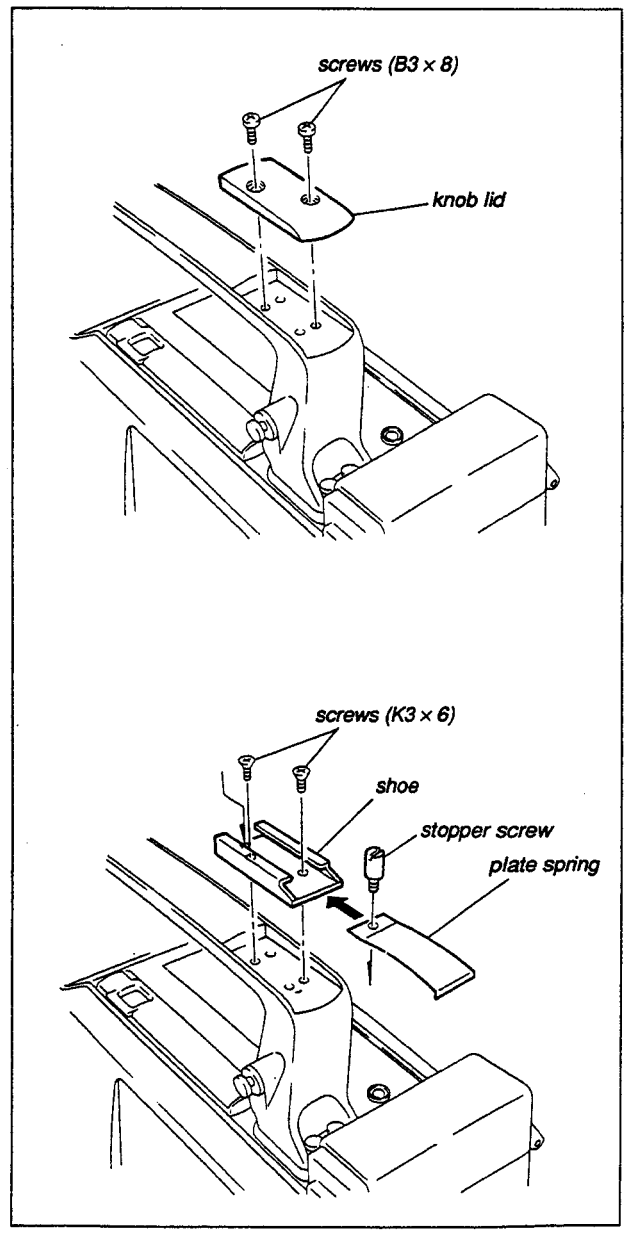
The following modification is required for attaching the viewfinder DXF-40B/50B.

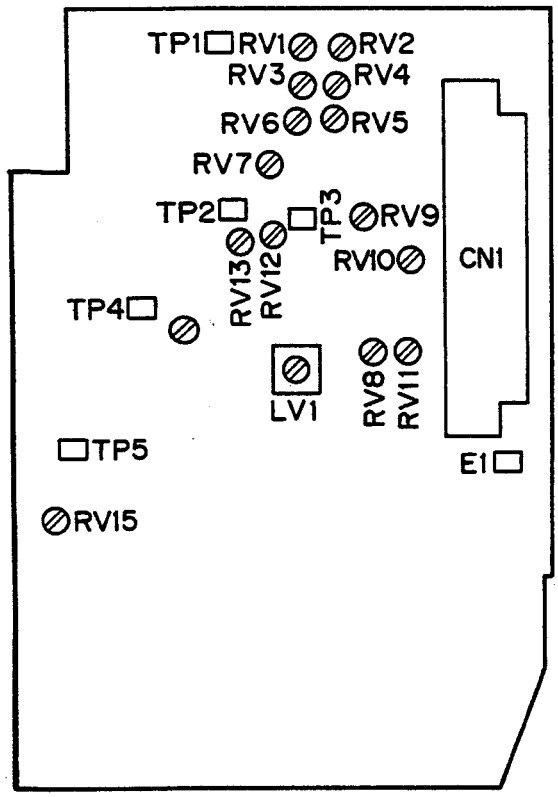
Required parts

Shoe ... 1 pc.
SONY Parts No.: 3-664-218-11
Plate spring ... 1 pc.
SONY Parts No.: 3-664-228-00
Stopper screw ... 1 pc.
SONY Parts No.: 3-664-213-00
Screws K3 x 6 ... 2 pcs.
SONY Parts No.: 7-682-247-04

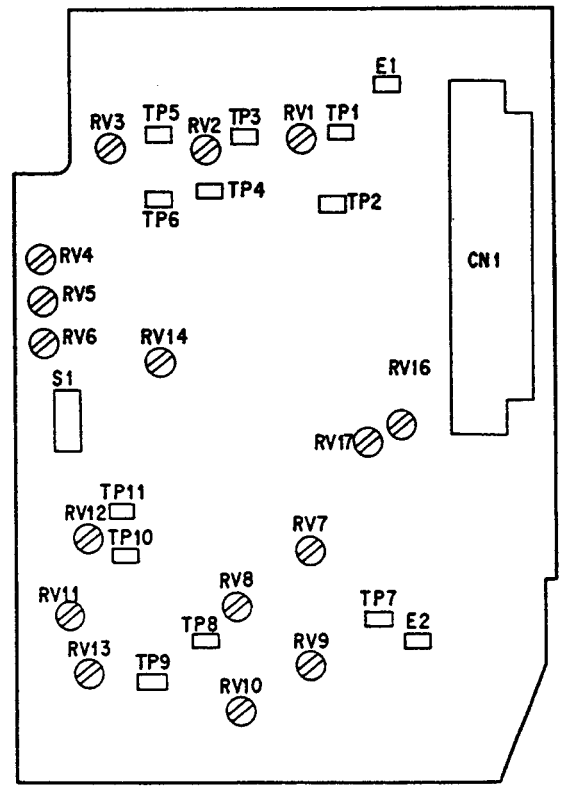
1. Remove the two screws (B3 x 8) and remove the lid of the handle.

2. After fixing the shoe with two screws (K3 x 6), fix the plate spring with the stopper screw.

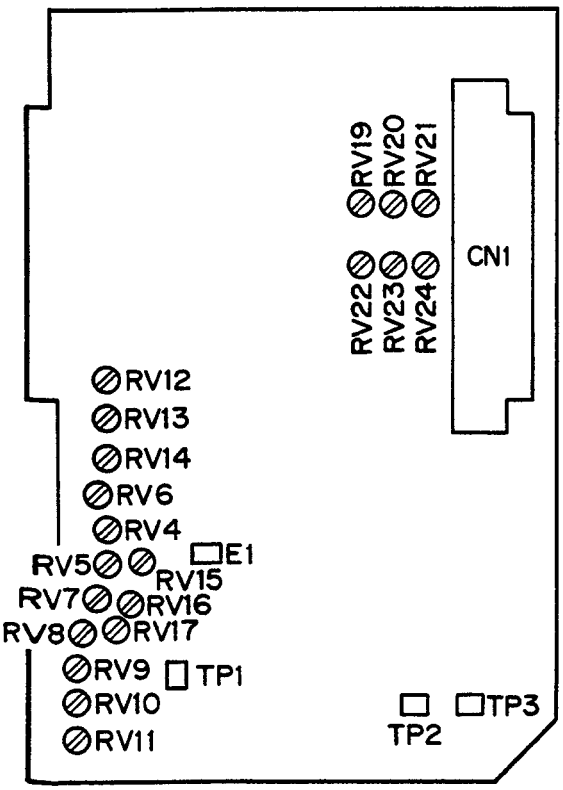




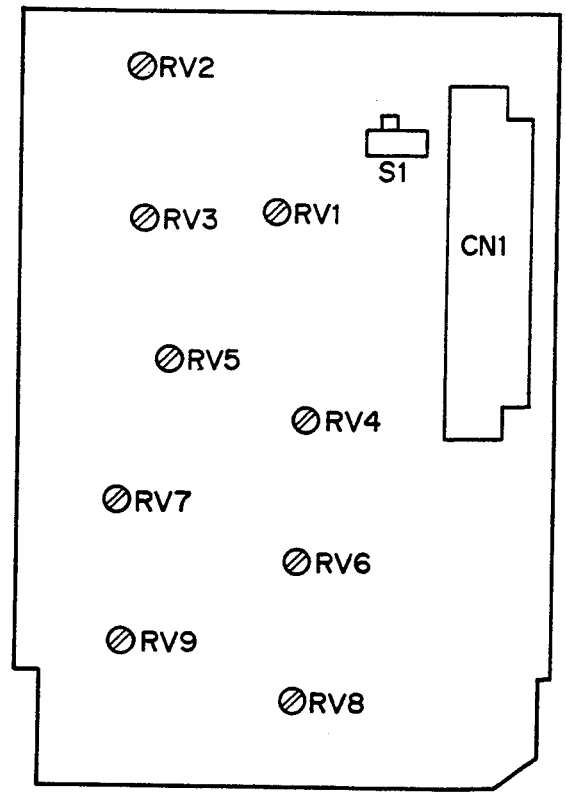
ES-7 BOARD



IE-33 BOARD



PR-208 BOARD



IF-454 BOARD

2-21. CHANGING THE VOLTAGE OF BATTERY BEFORE END/END

The voltage of the battery before end can be changed from the SYSTEM MENU as follows:

Range setting: 11. 0 V to 12.5 V
Minimum setting unit: 0.1 V
Voltage of Battery before end: set to 11.3 V when shipped. (Battery almost exhausted)
Voltage of Battery end: set to 11.0 V when shipped. (Battery exhausted)

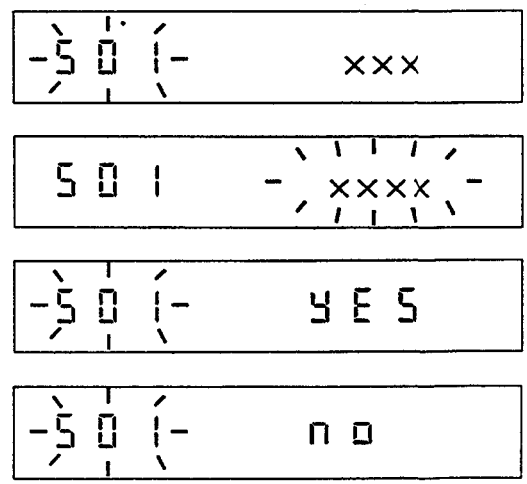
[Battery before end setting mode]

1. Go to the SYSTEM MENU (refer to section 2-22), and select "Battery before end setting" mode (Menu No. 501).

2. Press the RESET (MENU SET) button to turn the power input voltage off then on, then input the desired voltage.

3. Press the RESET (MENU SET) button (the desired voltage is stored in EEPROM).
   When the desired voltage is stored, display "YES".
   If the value cannot be stored in EEPROM because of an error, display "no". In this case,repeat steps 1 to 3.

LCD Display
* XXX indicates the remaind time.



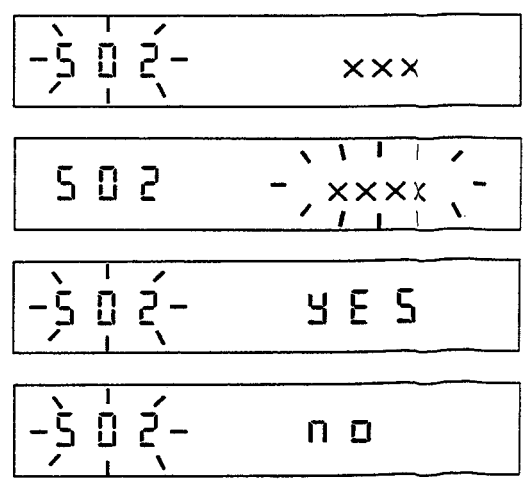
[Battery end setting mode]

1. Go to the SYSTEM MENU (refer to section 2-22), and select "Battery end setting" mode (Menu No. 502).

2. Press the RESET (MENU SET) button to turn the power input voltage off then on, then input the desired voltage.

3. Press the RESET (MENU SET) button (the desired voltage is stored in EEPROM).
   When the desired voltage is stored, display "YES".
   If the value cannot be stored in EEPROM because of an error, display "no". In this case, repeat steps 3 to 5.

   NOTE: VTR operation stops at the voltage of battery end which is set.
   recommend voltage: 11.0 V



2-22. VTR MENU

The settings of the system, adjustments and the settings of the VTR menus during maintenance can be determined using the LCD on this unit. There are three menus:

1. USER MENU
   For user operations.

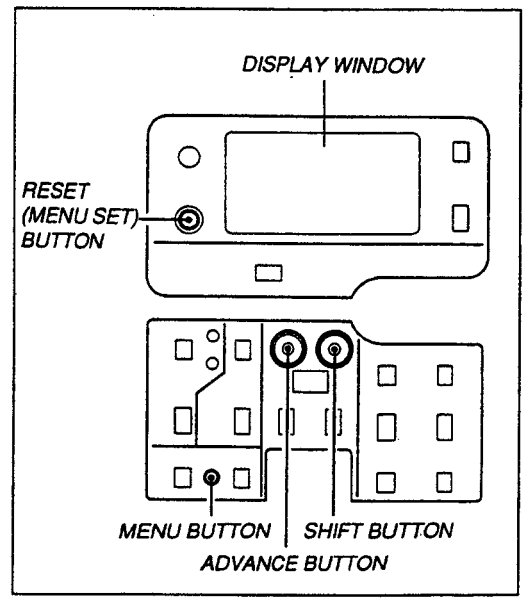
2. SYSTEM MENU
   Used to set up the system operations. (This menu is not for operators and is not described in the operation manual.)

3. MAINTENANCE MENU
   This menu is used when performing maintenance (including adjustments).

2-22-1. USER MENU

To make settings using the USER menu

(1) Press the MENU button in the TC panel.

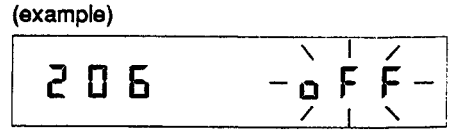


The LCD indicates "101 1994", and the unit enters the USER menu.

(2) Press the ADVANCE button repeatedly to change the menu number in the LCD to the required menu number.

(3) Press the SHIFT button to select the menu.
The current setting appears, and the setting can be changed.

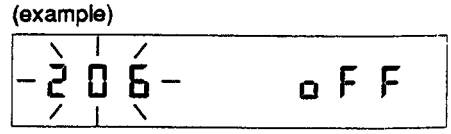
(example)



(4) Press the SHIFT button to switch to the next portion to set, then press the ADVANCE button to change the value of the blinking numbers.

(5) Press the RESET (MENU SET) button.
The setting is registered and the menu number blinks again.

(example)



(6) Press the MENU button.
The LCD returns to the display before the USER menu.

□ is the factory setting

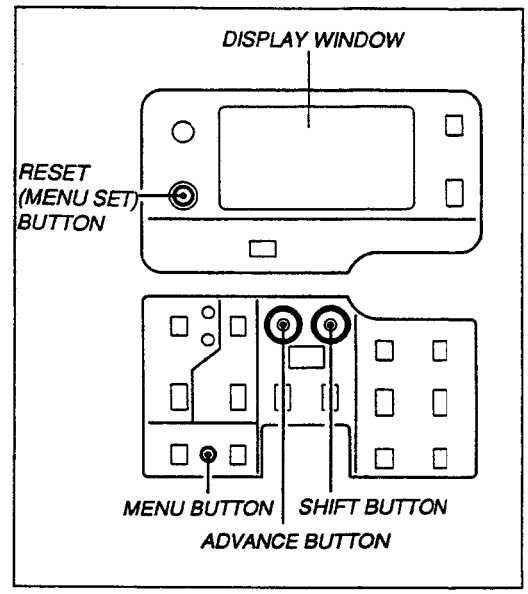
MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
101	———	101 1994	Setting the real time clock and calendar
201	DRUM RUN METER	201 ××××	Displaying the head drum/tape transport/total operation hours A:Head drum operating hours B:Tape transport operation hours C:Operating hours (Total with power on) ※ Select menu number 201,and press the SHIFT button. Pressing the SHIFT button cycles through the following displays. • Head drum operating hours • Tape transport operation hours • Operating hours (Total with power on) • Menu number indication
204	DF/NDF SELECT	204 dF [DF] / NDF	Selectig drop-frame/non-drop-frame mode of time code generator NDF : Non-drop-frame DF : Drop-frame ※ NTSC only used.
206	ANTON BAUER	206 oFF	Changing ON/OFF of anton battery (Battery indicator and super light control)
207	STANDBY TIMER	207 08 1 / 3 / 5 / [8]	Sets the release time of standby mode to 1, 3, 5 or 8minutes.

Refer to section 1 on pages 1-49 to 1-50 for the USER menu. (Menu No. 206 ANTON BAUER is not described in the operation manual.)

2-22-2. SYSTEM MENU

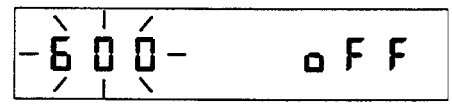
To make settings using the system menu

(1) Press the MENU button while pressing the SHIFT button in the TC panel.



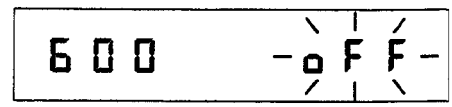
The LCD indicates "101 1994".

(2) Release the SHIFT button while still pressing the MENU button.
Confirm that the dispay indicates "600 OFF" after 1 second, then release the MENU button.



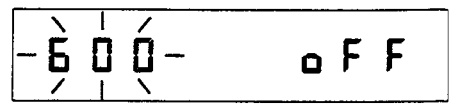
(3) Press the ADVANCE button or SHIFT button to change the menu number in the LCD to the required menu number.
Pressing the ADVANCE button (+ button) cycles through the following displays:
600→301→302→303···509→600···
Pressing the SHIFT button (– button) cycles through the following displays:
600→509→503→502···301→600···

(4) Select the required menu number, then press the RESET (MENU SET) button.
The current setting appears,and the setting can be changed.



(5) Press the ADVANCE button to change the value of the blinking number.

(6) Press the RESET (MENU SET) button at the required menu number.
The settings is registered and the menu number blinks again.



(7) Press the MENU button.
The LCD returns to the display before the SYSTEM menu.

☐ is the factory setting

MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
301	CCZ MIC 60 dB ON/OFF SELECT	301 oFF ON /[OFF]	Selects the microphone output level of EXT VTR (CCZ 26-pin) at the rear. ON : –60 dBm OFF: –20 dBm Select when the unit is connected to a device which the microphone input level is the –60 dBm setting.
302	CAMERA ATTENUATOR ON/OFF SELECT	302 oFF ON /[OFF]	Selects the camera microphone gain. ON : Attenuated about 20 dBu (input sensitivity –40 dBu) Turn on when sound is distorted even if the volume is low. OFF: Normal level (input sensitivity –60 dBu)
303	DOLBY ON/OFF SELECT	303 on [ON] / OFF	Selects the DOLBY ON/OFF ON : DOLBY ON OFF: DOLBY OFF **NOTE:** Switches on and off in menu mode only when S550 on the TC-86 board is set to "MENU". (Refer to Section 2-16 for setting of S550/TC-86/86A board.)
304	AUDIO CH1 ATTENUATOR ON/OFF SELECT	304 oFF ON /[OFF]	Selects the gain when audio input CH1 (XLR) at the rear is MIC. ON : Attenuated about 20 dBu (input sensitivity –60 dBu) Turn on when sound is distorted even if the volume is low. OFF: Normal level (input sensitivity –60 dBu)
305	AUDIO CH2 ATTENUATOR ON/OFF SELECT	305 oFF ON /[OFF]	Select the gain when audio input CH2 (XLR) at the rear is MIC. ON : Attenuated about 20 dBu (input sensitivity –40 dBu) Turn on when sound is distorted even if the volume is low. OFF: Normal level (input sensitivity –60 dBu)
306	VR CONTROL	306 oFF ON /[OFF]	Selects the AUDIO LEVEL knob on the panel or preset volume in the board to set the audio level volume. ON : Preset volume in the board Select when adjusting the audio input level. OFF: AUDIO LEVEL knob on the panel
307	LIMITTER ON/OFF SELECT	307 on [ON] / OFF	Switches the limiter on and off when the audio select switch (TC panel) is "MANU". ON : Limiter ON OFF: Limiter OFF

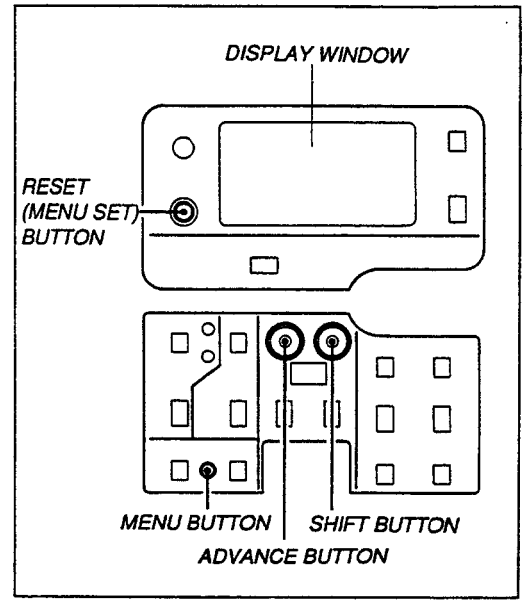
☐ is the factory setting

MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
401	BACK TALLY MODE SELECT	401 oFF ON /[OFF]	Changing the real REC mode on and off. ON : REAL REC MODE OFF: REC MODE & WARNING DISPLAY
402	HUMID MODE SELECT	402 oFF ON /[OFF]	ON : When VTR is REC mode, REC continne to operate even if the VTR is numidified When VTR is other mode, ON is the same as OFF. OFF: HUMID ALARM is displayed to protect the tape when the unit is humidified, and the VTR stops for the period specified by the HUMID TIMER. (Refer to Section 2-8.)
501	BATTERY BEFORE	501 ×××	Sets the battery-before end voltage (voltage just before the battery loses its power to operate) from 11.0 to 12.5 V. (Refer to Section 2-21.)
502	BATTERY END	502 ×××	Sets the battery-end voltage (voltage when the battery loses its power to operate) from 11. 0 to 12. 5 V. (Refer to Section 2-21.)
503	J/UC/EK SELECT	J / UC / E	Switches the date format on the LCD. (Setting format of U-bit when TC mode switch 1 or TC panel is set to DATE/TIME.) When setting the U-Bit value, set TC mode switch 1 (TC panel) to the DATE/TIME to record the date on the time code track as follows. J : Year/Month/Day UC : Day/Month/Year EK : Month/Day/Year * The factory setting depends on the model type.
509	HUMID TIMER OFF	509 ×××	When HUMID MODE is off in factory setting menu No. 402, HUMID ALARM is displayed to protect the tape if the unitis humidified, and the VTR stops for a period specified by the HUMID TIMER. However, if the unit is dehumidified manually, the HUMID TIMER can be canceled in this menu. (Refer to Section 2-8.) **NOTE**: If the unit is still humidified, the timer cannot be canceled.
600	MAINTENANCE MENU ON/OFF SELECT	600 oFF ON /[OFF]	Switches on and off the maintenance menus (menu No. 601 to 607). ON : Displays the maintenance menus (menu No. 601 to 607) and the settings are changeable. OFF: Does not display the maintenance menus (menu No. 601 to 607).

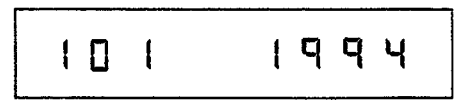
2-22-3. MAINTENANCE MENU

To use the MAINTENANCE menu

(1) Press the MENU button to indicate "101 1994" while pressing the SHIFT button in the TC panel.

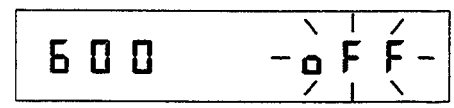


The LCD indicates "101 1994".

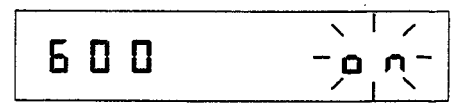


(2) Release the SHIFT button still pressing the MENU button. Confirm that the dispay indicates "600 OFF" after 1 second, then release the MENU button.

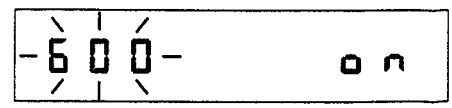
(3) Press the RESET (MENU SET) button while the menu number 600 is being displayed. (OFF blinks)



(4) Press the ADVANCE button and select "on".



(5) Press the RESET button. (600 blinks)
The unit enteres the maintenance menu (menu number 600-607).
*When menu number 600 is set to "on", the SYSTEM menu is displayed and the settings can be changed.



(6) Press the ADVANCE button to change the menu number in the LCD to the required menu number.
Pressing the ADVANCE button (+ button) cycles through the following displays:
600→601→602→603···509→600···
Pressing the SHIFT button (– button) cycles through the following displays:
600→509→503→502···301→600···

(7) Press the RESET (MENU SET) button at the required menu number to set up and adjust each menu.

(8) Press the MENU button.
The LCD returns to the display before the SYSTEM menu.

*Turning the POWER switch off sets,menu number 600 to "OFF" automatically, even when set to "on".

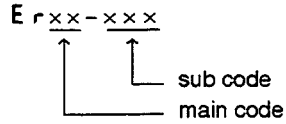
□ is the factory setting

MENU No.	MENU DESCRIPTION	LCD/ FACTORY SETTING	CONTENTS
601	CAPSTAN SPEED ADJUSTMENT	601	Starts to automatically adjust the capstan speed by pressing the RESET (MENU SET) button. After adjustment, data is written to the EEPROM and the LCD displays the adjustment result (yes or no). (Refer to Section 9-3-1.)
602	STOP SERVO ADJUSTMENT	602	Adjusts the stop servo level with the FF button to increase the gain and REW button to decrease the gain.The FF and REW cannot be used during this adjustment.After adjustment, data is written to the EEPROM by pressing the RESET (MENU SET) button and the LCD displays the adjustment result (yes or no). (Refer to Section 9-3-2.) In this mode, the slack mute is on regardless of the slack mute setting on menu No.
603	SLACK MUTE SETTING	603 oFF ON / [OFF]	Switches the mute of the slack detection on and off. ON : Slack mute is on. An oxide tape can be used. OFF: Slack mute is off. Press the RESET (MENU SET) button and ADVANCE button to switch the slack mute on or off. **NOTE:** This setting is effective only when the power is turned on. After the power is turned off, the slack mute is automatically turned off.
604	TRACKING CONTROL ADJUSTMENT	604	Controls the tracking using the FF and REW keys while playing. When the PLAY button is pressed, the tracking is reset to the center. The FF and REW operations are performed only in STOP mode. *It is possible to enter menu No.604 mode while playing or before playing.
605	SWITCHING POSITION ADJUSTMENT	605	Possible to adjust the switching position using the FF and REW keys while playing.When only the FF/REW button is pressed, the switching position is finely adjusted,when the PLAY + FF or REW keys are pressed, the switching position is coarsely-adjusted.The switching position can be moved only in playback mode.While this menu is selected, H-LOCK of the video is off.After adjustment, data is written to the EEPROM by pressing the RESET (MENU SET) button and the LCD displays the adjustment result (yes or no).The FF and REW operations can be performed in STOP mode. (Refer to Section 6.) *It is possible to enter menu No.605 mode while playing or before playing.

2-23. ERROR CODES

This set provides an error display function that displays the error if a trouble condition occurs.
When a failure is detected in the normal operating state, the error is immediately displayed on the display window.
And then,the warning indicator lights or blinks(4 Hz frequency) and the tally indicator blinks (4 Hz or 1Hz frequency).
In most cases, when an error occurs, the system enters the protective action and stops to operate.
Each error is displayed by its error code.
The contents of the error codes are as follows.

Error code display

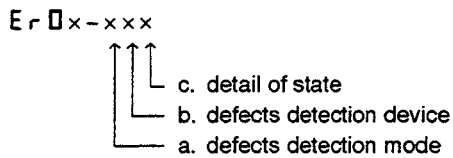


1. Main code
   The factors of error are divided into three classes.
   Er0x – xxx: defects around mechanism control
   Er3x – xxx: defects of sensor system
   Er91 – xxx: defects of CPU and around CPU

2. Sub code
   Sub code subdivides the factors of error.
   When the information of error codes are sufficiency,the sub code is "000".

   (1) Sub code of the defects around mechanism control

   Error code display



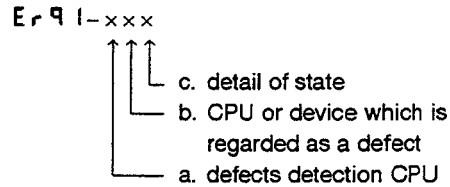
   a. Defects detection mode
      0: It cannot specify the mode.
      2: Threading mode
      3: STOP mode
      4: F FWD/REW mode
      6: PLAY/REC mode
      8: Unthreading mode

   b. Defects detection device
      2: Function Cam Motor / Cam Position Sensor
      3: Drum Motor / Drum FG
      4: Capstan Motor / Capstan FG
      5: Supply reel FG
      7: Take up reel FG

   c. Detail of state
      1: Operation cannot end within the fixed time.
      2: It detects the unusual speed.
      4: It can not detect the FG.
         (It detects the tape slack)

   (2) Sub code of defects of CPU and around CPU.

   Error code display



   a. Defects detection CPU
      1: System Control CPU (SS-57/57A board, IC1)
      2: LCD Control CPU (TC-86/86A board, IC1)
      4: Mechanism Control CPU (SS-57/57A board, IC201)
      6: Camera Control CPU (AT-85 board, IC9)

   b. CPU or device which is regarded as a defect
      1: System Control CPU (SS-57/57A board, IC1)
      2: LCD Control CPU (TC-86/86A board, IC1)
      3: EEPROM (SS-57/57A board, IC214)
      4: Mechanism Control CPU (SS-57/57A board, IC201)
      5: Time Code CPU (TC-86/86A board, IC10)
      6: Camera Control CPU (AT-85 board, IC9)
      7: EEPROM (TC-86/86A board, IC3)

   c. Detail of states
      5: Communication impossibility
      6: Read data check sum NG

Error code list

Error Code	TALLY Indicator	WARNING Indicator	Contents	Error detecting method	Possible failure
Er02-454 Er02-474 Er02-654 Er02-674	Blinks (4 Hz)	Blinks (4 Hz)	**No reel rotation / reel stoppage** • The reel motor would not operate for a specific time in the reel operation mode; the tape protective action was executed.	The rotational speed obtained from the FG output of Supply or Takeup reel is zero for a specific time.	• Cut or coiling tape • Poor adjustment of tape tension/torque • Malfunction of capstan motor • Improper operation of pinch roller block assembly • Improper operation of brake assembly • Faulty circuit in reel FG system • Improper operation of reel brake • Cut tape • Looseness of set screws for securing the reel base assembly • Damaged reel base assembly
			Incorrect increase of reel rotational speed • The rotational speed of reel motor became incorrectly faster in the reel operation mode;the tape protective action was executed.	The rotational speed obtained from the FG output of reel is more than the specified value for a specific time.	
			Reel motor won't stop • When the mode is switched from F FWD/ REW to STOP mode, the reel motor would not stop within a specific time; the protective action was executed.	The rotational speed obtained from the FG output of reel was not zero in a specific time.	
			sub code 454: F FWD/REW mode Supply reel detected a failure. 474: F FWD/REW mode Takeup reel detected a failure. 654: Playback/record mode Supply reel detected a failure. 674: Playback/record mode Takeup reel detected a failure.		
Er07-x42	Blinks (4 Hz)	Blinks (4 Hz)	**No capstan rotation** • The capstan motor would not operate for a specific time in the F FWD/REW mode; the tape protective action was executed.	The rotational speed obtained from the FG output of capstan motor is zero for a specific time.	• Poor adjustment of capstan free speed (capstan FG duty ratio) • Malfunction of capstan motor • Faulty circuit in capstan FG system • Break or poor connection of harness
Er08-x32	Blinks (4 Hz)	Blinks (4 Hz)	**No drum rotation/drum stoppage** • The drum motor would not rotate for a specific time in the drum rotation mode; the tape protective action was executed.	The rotational speed obtained from the FG output of drum motor is less than the specified value for a specific time.	• Tape coiling around drum • Break or poor connection of harness • Malfunction of drum motor • Faulty circuit in drum FG/PG system

Error Code	TALLY indicator	WARNING indicator	Contents	Error detecting method	Possible failure
Er09-221	Blinks (4 Hz)	Blinks (4 Hz)	**Failure in threading operation** • The threading operation was not completed within a specific time; the operation was stopped. (Switch from threading end state to STOPped state) (Switch from STOPped state to unthreading end state)	The threading operation was not completed in a specific time after commanded by system microcomputer.	• Failure in reel motor brake operation • Malfunction of threading motor • Improper gear position of threading unit • Improper detection by cam mode sensor • Break or poor connection of harness
Er09-821	Blinks (4 Hz)	Blinks (4 Hz)	**Failure in unthreading operation** • The unthreading operation was not completed within a specific time; the operation was stopped. (Switch from unthreading end state to STOPped state) (Switch from STOPped state to threading end state)	The unthreading operation was not completed in a specific time after commanded by system microcomputer.	
Er09-x21	Blinks (4 Hz)	Blinks (4 Hz)	**Operating mode was not executed.** • The specific operating mode was not executed after specific time (three seconds).	The input signal could not be received from cam position sensor because the function cam was not moved in a specific time (three seconds).	• Failure in reel motor brake operation • Malfunction of threading motor • Improper gear position of threading unit • Improper detection by cam mode sensor • Break or poor connection of harness
Er31-000	———	———	The tape top sensor detected the failure (the tape top sensor was detected tape top after SHORT FF state); the protective action was executed. PLAY, FFWD, EJECT, record commands are execute.		• Fault in tape top/end LED • Break or poor connection of harness • Fault in detection circuit
Er32-000	———	———	The tape top sensor detected the failure (the tape end sensor was detected tape end after SHORT REW state); the protective action was executed. REW, EJECT commands are execute.		

Error Code	TALLY Indicator	WARNING Indicator	Contents	Error detecting method	Possible failure
Er91-12x	Blinks (4 Hz)	Lights	**Failure in communication between system control microcomputer and LCD control microcomputer.** • The communication between system control microcomputer (SS-57/57A board, IC1) and LCD control microcomputer (TC-86/86A board, IC1) was impossible. After a few seconds, Normal actions (PLAY, F FWD, REW, EJECT, record commands) are executed, but tag recording and time code recording are not executed.	The system control microcomputer (SS-57/57A board, IC1) detected a failure in communication between system control microcomputer and LCD control microcomputer (TC-86/86A board, IC1).	• Fault in LCD control microcomputer (TC-86/86A board, IC1) • Break or poor connection of harness
Er91-14x	Blinks (4 Hz)	Lights	**Failure in communication between system control microcomputer and mechanism control microcomputer** • The communication between system control microcomputer (SS-57/57A board, IC1) and mechanism control microcomputer (SS-57/57A board, IC201) was impossible; the protective action was executed.	The system control microcomputer (SS-57/57A board, IC1) detected a failure in communication between system control microcomputer and mechanism control microcomputer (SS-57/57A board, IC201).	• Fault in mechanism control microcomputer (SS-57/57A board, IC201) or around circuit
Er91-16x	———	Lights	**Failure in communication between system control microcomputer and camera control microcomputer** • The communication between system control microcomputer (SS-57/57A board, IC1) and camera control microcomputer (AT-85 board, IC9) was impossible. The action except record command is executed.	The system control microcomputer (SS-57/57A board, IC1) detected a failure in communication between system control microcomputer and camera control microcomputer (AT-85 board, IC9).	• Fault in camera control microcomputer (AT-85 board, IC9) or camera. • Break or poor connection of harness.
Er91-21x	———	———	**Failure in communication between system control microcomputer and LCD control microcomputer.** • The communication between system control microcomputer (SS-57/57A board, IC1) and LCD control microcomputer (TC-86/86A board, IC1) was impossible.	The LCD control microcomputer (TC-86/86A board, IC1) detected a failure in communication between system control microcomputer (SS-57/57A board, IC1) and LCD control microcomputer (TC-86/86A board, IC1).	• Fault in system control microcomputer (SS-57/57A board, IC1) • Break or poor connection of harness

Error Code	TALLY Indicator	WARNING Indicator	Contents	Error detecting method	Possible failure
Er91-25x	———	———	**Failure in communication between LCD control microcomputer and time code microcomputer.** • The communication between LCD control microcomputer (TC-86/86A board, IC1) and time code microcomputer (TC-86/86A board, IC10) was impossible.	The LCD control microcomputer (TC-86/86A board, IC1) detected a failure in communication between LCD control microcomputer and time code microcomputer (TC-86/86A board, IC10).	• Fault in time code microcomputer (TC-86/86A board, IC10)
Er91-27x	———	———	**Failure in communication between LCD control microcomputer and EEPROM.** • Check sum was NG when LCD control microcomputer (TC-86/86A board, IC1) read data from EEPROM (TC-86/86A board, IC3).	LCD control microcomputer (TC-86/86A board, IC1) detected the incorrect data in the contents of EEPROM data (TC-86/86A board, IC3).	• Fault in EEPROM (TC-86/86A board, IC3)
Er91-436	Blinks (4 Hz)	Lights	**Failure in data for mechanism control microcomputer adjustment.** • The check sum of adjustment data of mechanism control microcomputer (SS-57/57A board, IC201) was impossible; the protective action was executed.	The mechanism control microcomputer (SS-57/57A board, IC201) detected a failure in read data check sum from EEPROM (SS-57/57A board, IC214).	• Fault in EEPROM (SS-57/57A board, IC214)
Er92-000	———	———	The 1/2 VD signal could not be detected.	The LCD control microcomputer (TC-86/86A board, IC1) could not detect the 1/2 VD signal.	• Break or poor connection of harness
Er93-000	Blinks (4 Hz)	———	The REF.SYNC signal could not be detected. Record command is not excuted.	SYNC detector (SS-57/57A board, IC1) could not detect SYNC signal.	• Fault in camera • Break or poor connection of harness

2-24. NOTES ON REPAIR PARTS

2-24-1. Notes on Repair Parts

(1) Safety Related Components Warning
Components marked with ## on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

(2) Standardization of Parts
Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts".
This manual's exploded views and electrical spare parts list are indicating the part numbers of "the standardized genuine parts at present".

(3) Stock of Parts
Parts marked with "o" SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

(4) Units for Capacitors and Resistors
The following units may be assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.
Capacitors : μF
Resistors : W

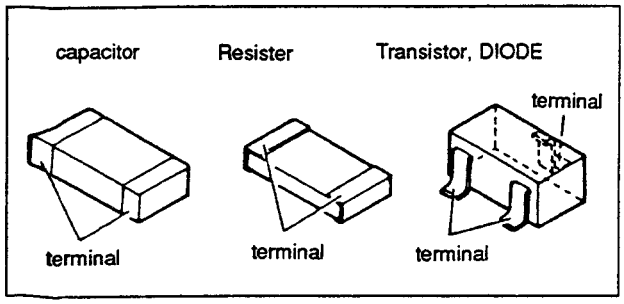
2-24-2. Replacement Procedure for Chip Parts

Required Tools

Soldering iron: 20W If possible, use a soldering iron tip heat-controller at 270 ± 10°C.
Braided wire : SOLDER TAUL or equivalent Sony part No. 7-641-300-81
Solder : 0.6 mm dia. is recommended.
Tweezers

Soldering Conditions

Soldering iron temperature: 270 ± 10°C.
Soldering time : less than two seconds per a pin.



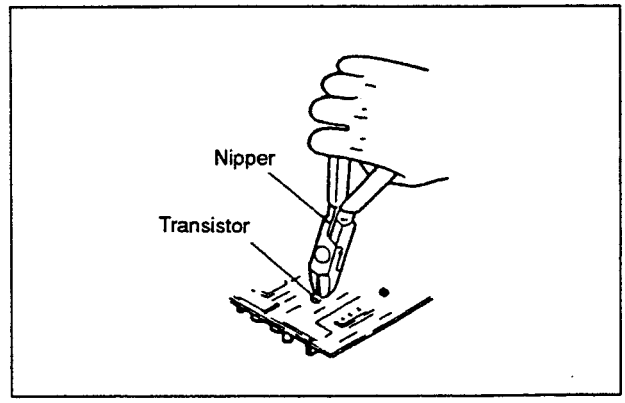
• **Resistor and Capacitor Replacement**

(1) Place the soldering iron tip onto the chip part and heat it up until the solder is melted. When the solder is melted, slide the chip part aside.
(2) Make sure that there is no pattern peeling, damage and/or bridges around the desoldering positions.
(3) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(4) Place new chip part in the desired position and solder both ends.

NOTE: Once a chip part has been removed, never use it again.

• **Transistor and Diode Replacement**

(1) Cut the terminals of the chip part with a nipper.
(2) Remove the cut leads.
(3) Make sure that there is no pattern peeling, damage and/or bridges around the desoldering positions.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the terminals.



• **IC Replacement**

(1) Using the braided wire, "SOLDER TAUL" Sony Part No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
(2) While heating up the pins, remove the pins one by one using sharp-pointed tweezers.
(3) Make sure that there is no pattern peeling, damage and/or bridges around the desoldering positions.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the pins.

SECTION 3
PERIODIC MAINTENANCE AND INSPECTION

3-1. MAINTENANCE TIME TABLE

The times in the tables, indicating when parts are to be replaced, are not time guarantee for parts. Use these times as references for drawing up maintenance and inspection schedules for extending the life of the unit and tape use.
The time to replace parts differs according to the environments and conditions in which the unit is being used.

◆: Replace ○: Clean

ITEM	Part No.	HOURS METER MODE	500 (H)	1,000 (H)	1,500 (H)	2,000 (H)	2,500 (H)	3,000 (H)	3,500 (H)	4,000 (H)	4,500 (H)	5,000 (H)	5,500 (H)
Upper drum ass'y (For NTSC)	A-8263-081-	A	◆	◆	◆ *2	◆	◆	◆ *2	◆	◆	◆	◆	◆
Upper drum ass'y (For PAL)	A-8263-083-	A	◆	◆	◆ *2	◆	◆	◆ *2	◆	◆	◆	◆	◆
Drum ass'y (For NTSC)	A-8263-080-	B	–	–	◆	–	–	◆	–	–	◆	–	–
Drum ass'y (For PAL)	A-8263-082-	B	–	–	◆	–	–	◆	–	–	◆	–	–
Slip ring ass'y	A-8267-886-	A	–	◆	–	◆	–	◆	–	◆	–	◆	–
Brush ass'y	A-6050-648-	A	–	◆	–	◆	–	◆	–	◆	–	◆	–
Tension regulator band ass'y	X-3722-325-	B	–	◆	–	◆	–	◆	–	◆	–	◆	–
S soft brake ass'y	X-3722-324-	B	–	◆	–	◆	–	◆	–	◆	–	◆	–
T soft brake ass'y	X-3722-323-	B	–	◆	–	◆	–	◆	–	◆	–	◆	–
S idler ass'y	A-6740-092-	B	–	–	–	–	–	◆	–	–	–	–	–
T idler ass'y	A-6740-091-	B	–	◆	–	◆	–	◆	–	◆	–	◆	–
Pinch roller	X-3722-363-	B	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Timing belt	3-722-452-	B	–	–	◆	–	–	◆	–	–	◆	–	–
Gear ass'y	X-3722-306-	B	–	◆	–	◆	–	◆	–	◆	–	◆	–
Slant table (rail)	3-725-214- 3-725-215- 3-725-217- 3-725-218-	B	–	○	–	○	–	◆	–	○	–	○	–
Loading cam gear	A-6737-190- A-6750-231- A-6750-233-	B	–	–	–	–	–	◆	–	–	–	–	–
Threading motor	1-698-346-11	B	–	–	◆	–	–	◆	–	–	◆	–	–
Capstan motor	1-698-345-11	B	–	–	◆	–	–	◆	–	–	◆	–	–
Full erase head	8-825-772-62	B	–	–	◆	–	–	◆	–	–	◆	–	–
CTL head	8-825-560-41	B	–	–	◆	–	–	◆	–	–	◆	–	–
AU head	8-825-779-51	B	–	◆	–	◆	–	◆	–	◆	–	◆	–

(NOTE) 1.HOURS METER MODE ··· A : Drum Running Meter B : Tape Running Meter C : Operation Meter
*2.When replacing the drum assembly, replace the upper drum, slip ring, and brush assemblies as well.

3-2. HOURS METER

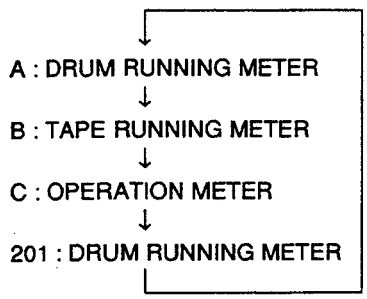
The hour meter is in the MENU mode.
It displays the total number of hours the unit has been power on, the total number of hours the drum has been rotating, and the total number of hours the tape has been running on the display window on the side.
It is recommended that this hour meter be used as a reference in maintenance.
Display the hour meter using the following method.

1. Press the MENU switch on the side panel with the tip of mechanical pencil or similer object to set the following display.
   (Example)

Year

2. Press the ADVANCE switch to set the DRUM RUNNING mode.
   (Example)

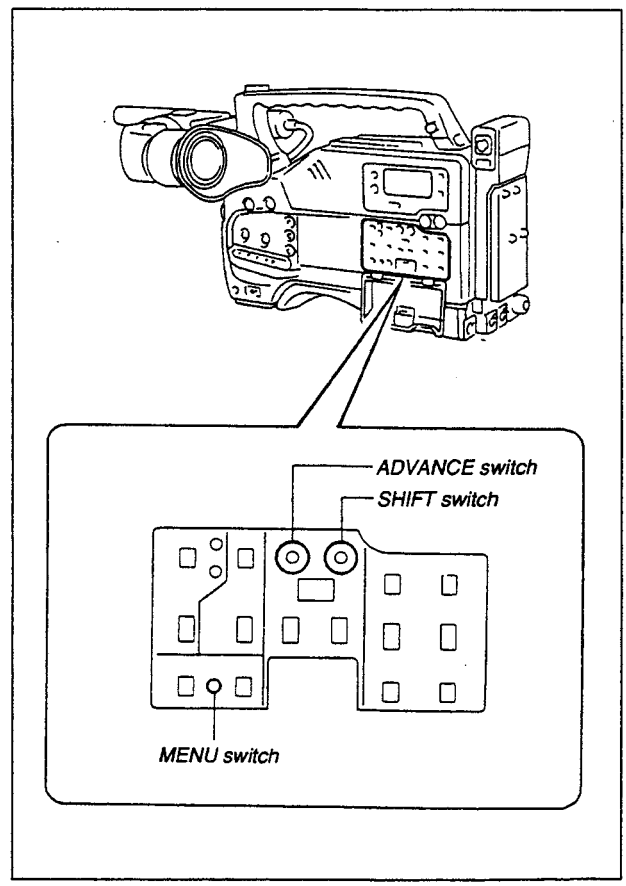
3. The display will change as follows each time the SHIFT key is pressed.



Example : A
This indicates that the drum has been rotating for a total of 150 hours.

4. To end the MENU mode, press the MENU switch again.

(Note) When replacing the TC-86 board, be sure to replace the non-volatile memory (IC3).



3-3. MAINTENANCE AFTER REPAIRS

Perform the following maintenance after repairs regardless of the number of hours the unit has been operating.

1. Clean the video head and stationary heads.
2. Clean the tape running areas.

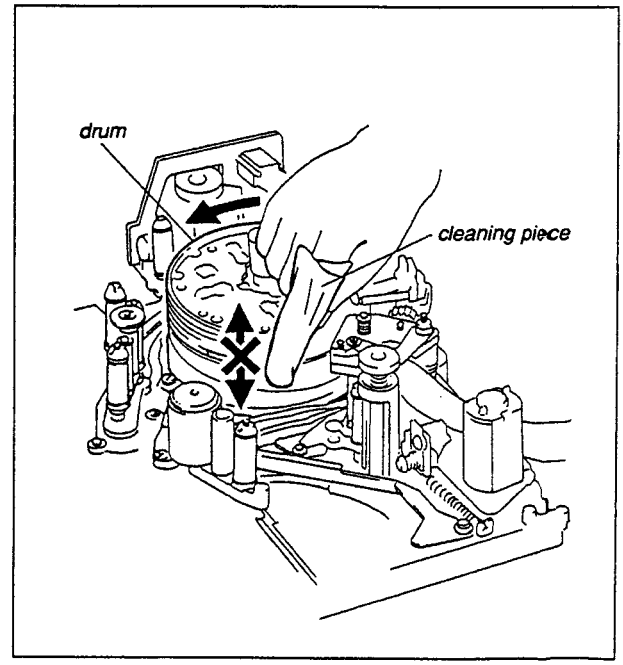
3-4. CLEANING PROCEDURE

Remove the Cassette-up Compartment for cleaning. (Refer to Section 4-5)
Cleaning procedures are as follows. Be sure not to insert a cassette tape before the cleaning fluid evaporate completely.

3-4-1. Video Head

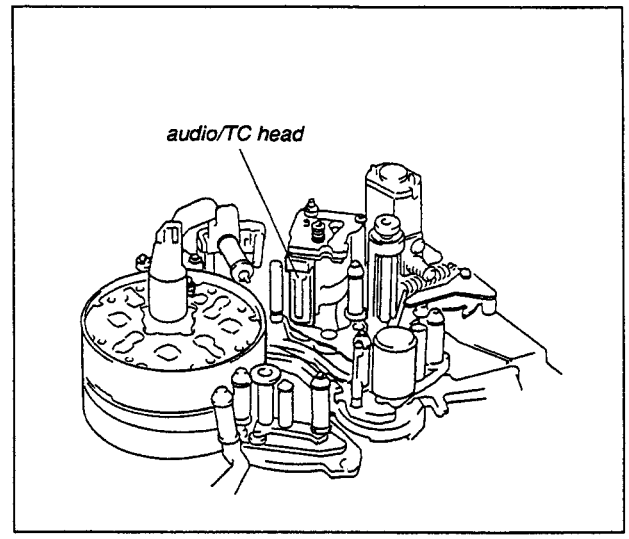
Press the cleaning piece moistened with the cleaning fluid and turn the drum slowly with hand.

(NOTE) • Never move the cleaning piece in the vertical direction of the head tip during cleaning.
• Clean the head with the power OFF.



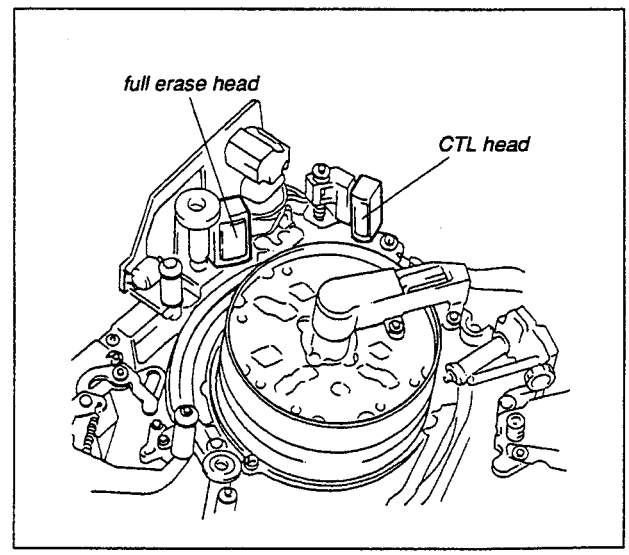
3-4-2. Audio/TC Head

Clean with the cleaning piece moistened with the cleaning fluid.



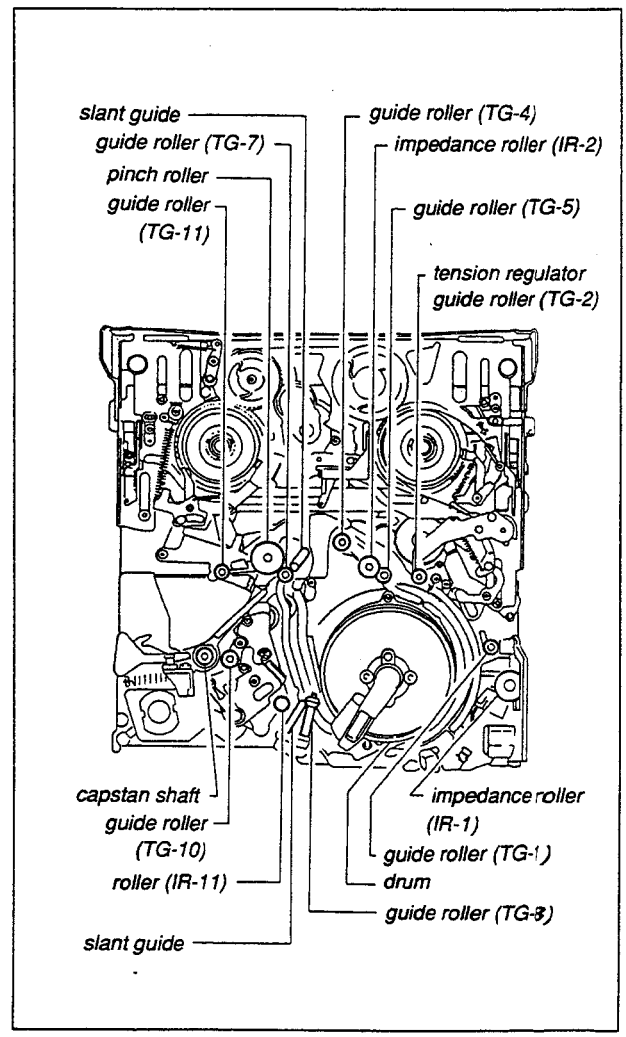
3-4-3. CTL, FE (Full Erase) Heads

Clean with the cleaning piece moistened with the cleaning fluid.



3-4-4. Tape Movement Areas

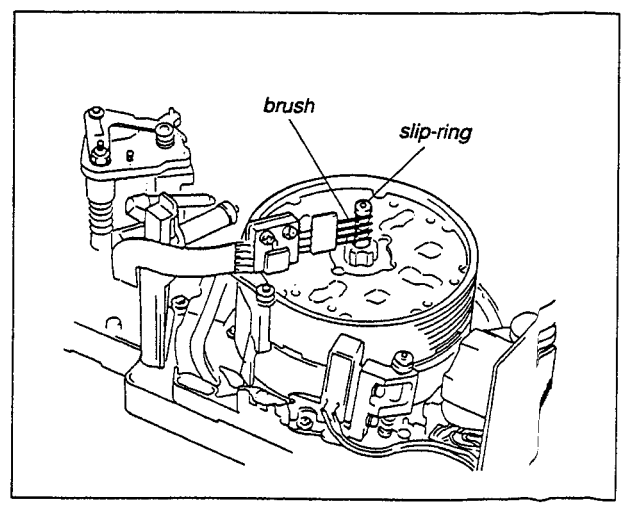
Clean with the cleaning piece moistened with the cleaning fluid; Tape guides, drum, capstan and the pinch roller as shown in the figure.



3-4-5. Slip-rings and Brushes

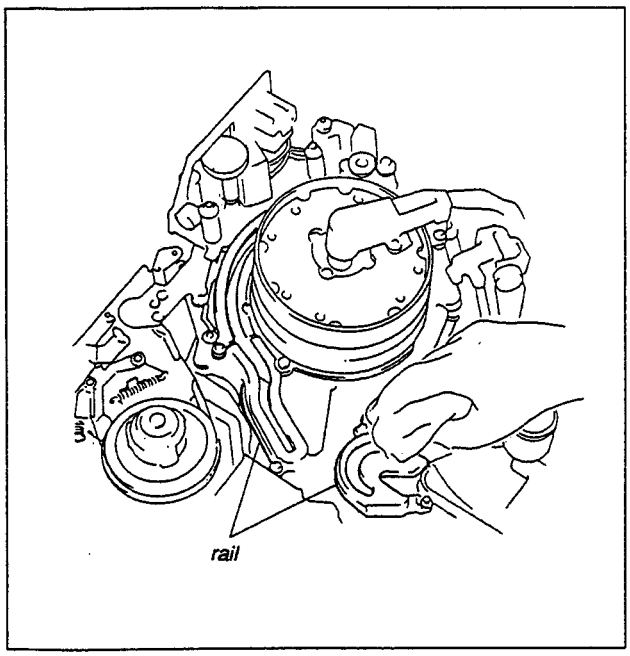
The Head Drum Assembly Slip-rings and Brushes do not require periodic cleaning.
However, if dust adheres to the Slip-rings or Brushes, clean them with a Soft brush which has short hairs. If this brush can not be obtained, use a Blower brush and Cotton Swab.

(NOTE) • Do not use alcohol as a cleaning fluid. If the Slip-ring and the Brushes are cleaned with alcohol, the surface tends to attract material which may increase the resistance at the contact area.
• Do not use conductive grease.



3-4-6. Rail

Clean with the cloth moistend with the alcohol.



3-5. AFTER USED AT SEASIDE OR DUSTY AREAS

It is recommended to check the following items after the news gathering at seaside or dust areas.

1. Clean off sand and other dust in the unit with a cleaning piece moistened with the cleaning fluid, or blow off with an air-brush carefully.
2. Clean the video head and sationary heads with a cleaning piece moistened with the cleaning fluid.
3. Clean the tape movement areas (the drum surface, tape guides, capstan shaft and the pinch roller) with a cleaning piece moistened with the cleaning fluid.
4. Clean the upper of chassis of the unit.
5. Clean the surface of the reel tables contacting with the brake shoes.
6. Rotate by hand and move the tape guides, pulley, capstan and the pinch roller, and check that any abnormal noise sounds or not. If there sounds a noise, replace the part immediately.
7. After the news gathering at seaside, remove the printed circuit board.
   Clean the printed circuit board with a cleaning piece moistened with the cleaning fluid after blow off sand on the completely. Then clean the soldering side in the same manners.
8. Clean the connector on the connector panel completely.
9. Perform the operation check and be sure that the machine operates normally.

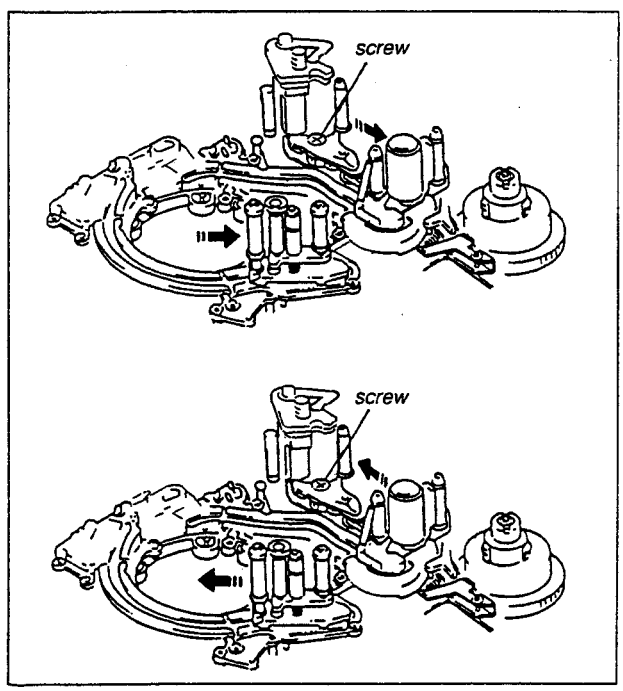
SECTION 4
REPLACEMENT OF THE MAJOR PARTS

4-1. PRECAUTIONS WHEN REPLACING PARTS

1. The mode of the unit when replacing parts is described in the Parts Replacement. The following is the description of the modes.

- EJECT: In this mode, the Pinch Roller, Tension Regulator Arm, T Base, and S Base have all completely returned to the reel table side.
  This condition can be set by turning the screw shown in the figure counterclockwise.

- Threading end:
  In this mode the Pinch Roller is placed in front of the Capstan Shaft, the T Base and S Base are in the positions of the T Support Bracket and S Support Bracket, and the Tension Regulator Arm is completely open.
  This condition can be set by turning the screw shown in the figure clockwise.



2. Replace parts with the VTR installed onto the unit, unless otherwise specified. At that time, remove the cover of the Cassette-up Compartment. (Refer to Section 4-5).

3. The polyslider washers used to fix parts should not be used again once they have been removed. Use a new one after replacement.
   When installing a polyslider washer to the shaft, push the polyslider washer until the space between it and the part is about 0.1 to 0.2mm.
   1.2mm diameter polyslider washer:
   3-559-408-11
   1.5mm diameter polyslider washer:
   3-321-813-01

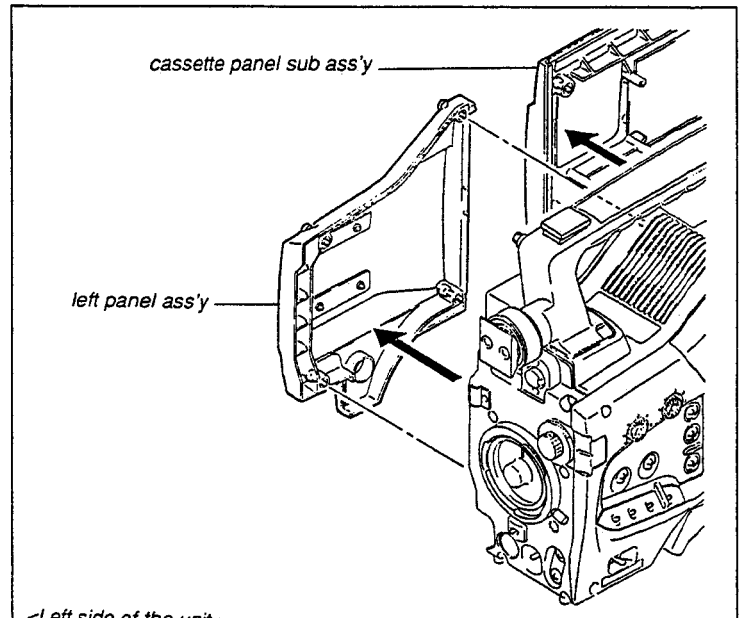
4. When tightening screws, be sure to keep the tightening torque. The torque driver and bits are provided.
   J-6325-400-A Torque driver (for 0.3N•m)
   J-6325-110-A Torque driver bit (for M1.4)
   J-6325-380-A Torque driver bit (for M2)

   Tightening torque
   1.4mm dia.screw: 0.09 ± 0.01N•m{0.9 ± 0.1kg•cm}
   2mm dia.screw: 0.3 ± 0.05N•m{3.0 ± 0.5kg•cm}

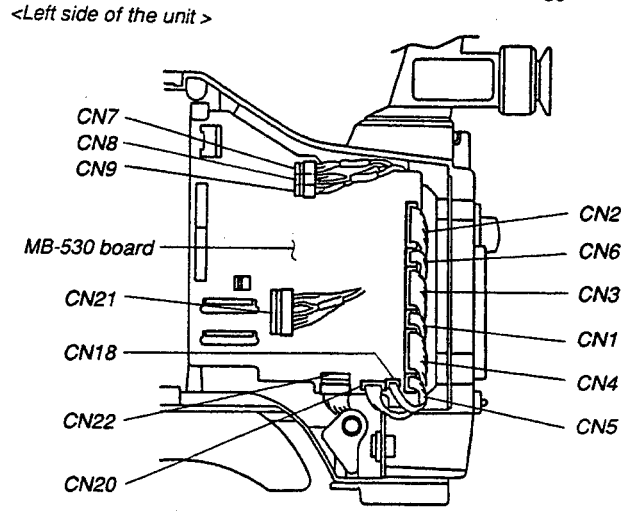
4-2. REPLACEMENT OF CCD UNIT

Replacement procedure:

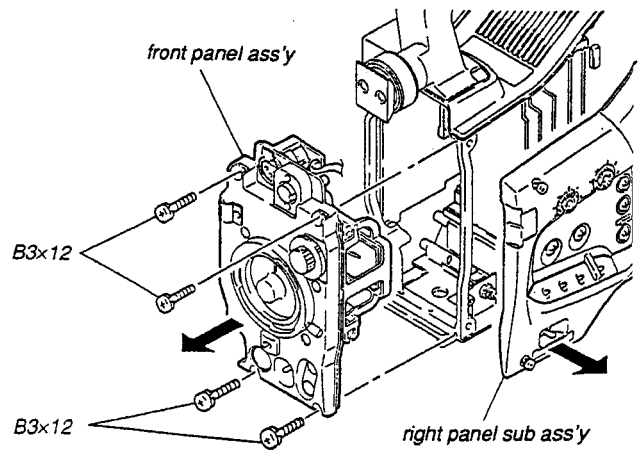
(1) Loosen the four screws respectively to remove the Cassette Panel Sub Assembly and Left Panel Assembly.)
(Refer to Section 2-1 Removal of the Cabinet.)



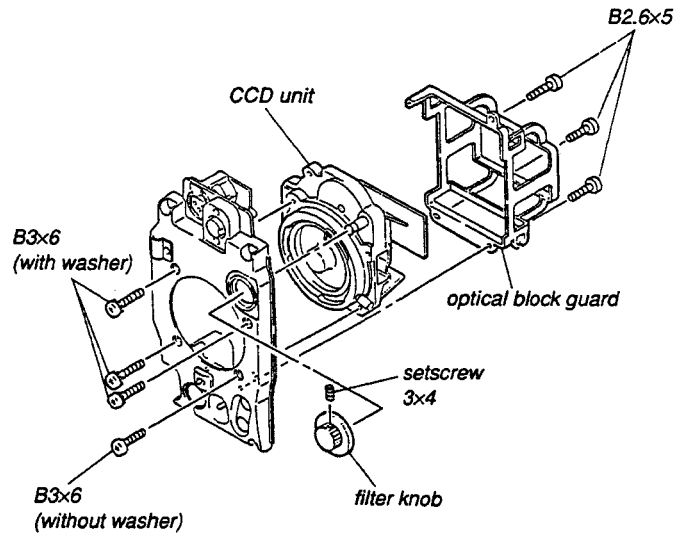
(2) Disconnect the 13 connectors (CN1 thru CN9, CN18 and CN20 thru CN22) on the MB-530 board.



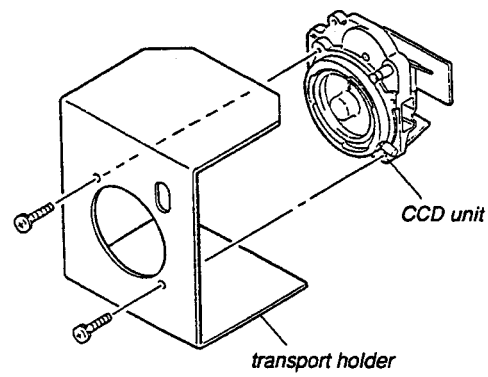
(3) Loosen the four screws to remove the Right Panel Sub Assembly. (Refer to Section 2-1 Removal of the Cabinet.)
(4) Disconnect the connector CN701B from the TC-86/86A board. (Refer to Section 2-1 Removal of the Cabinet.)
(5) Remove the four screws (B3 × 6) and pull out the Front Panel Assembly carefully toward you.



(6) Remove the three screws (B2. 6 × 5) to remove the optical block guard.
(7) Remove the setscrew (3 × 4) to remove the filter knob.
(8) Remove the four screws (B3 × 6; three with washer and one without washer) and remove the CCD unit from the Front Panel Assembly.
(Note) When handling the CCD unit, pay attention not to stress each PA board.



(9) Remove the transport holder from a replacement CCD unit supplied from the Sony Parts Center. Replace the CCD unit of the unit with the above one.
(Note) When transporting the CCD unit that was removed from the unit, reuse the transport holder.



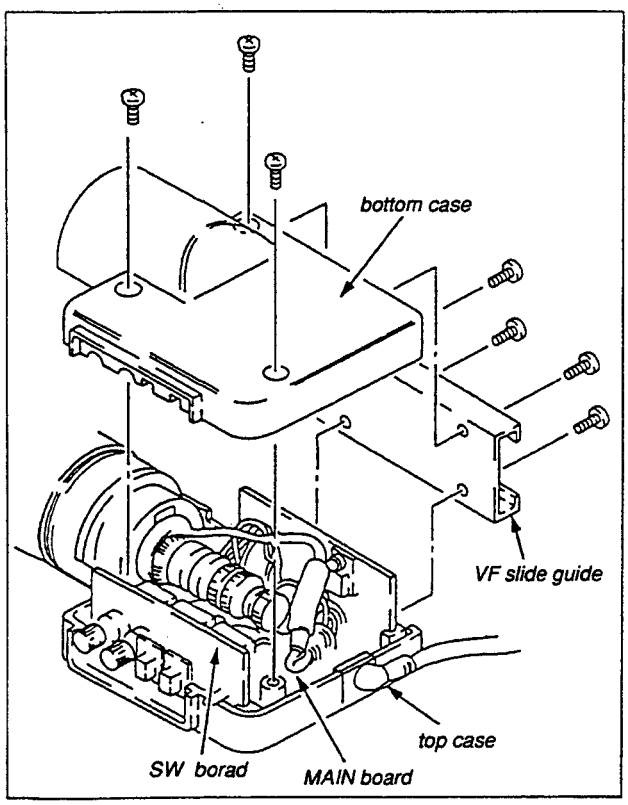
(10) Assemble in the reverse order of removal.
(Note) When fixing the CCD unit to the Front Panel Assembly, pay attention to fixing position of screw without washer.

(11) After the replacement is complete, perform several adjustments referring to Section 8-1-4. Note on Adjustment.

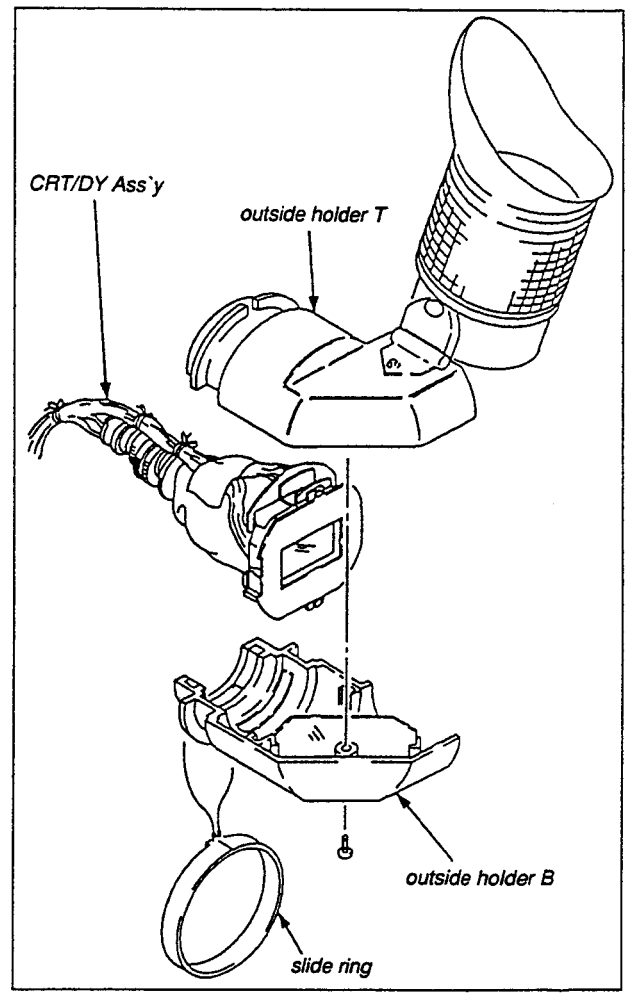
4-3. REPLACEMENT OF CRT/DY ASS'Y OF THE VIEWFINDER

(Note) If a deflection yoke is replaced, you should replace assembly of CRT and deflection yoke (CRT/DY ASS'Y).

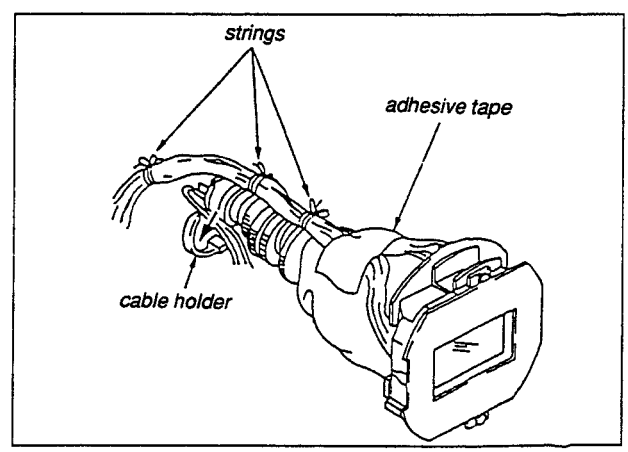
1. Remove seven screws shown in Figure.
   Remove the bottom case and VF slide guide.
   Extract the SW board and MAIN board from a top case.



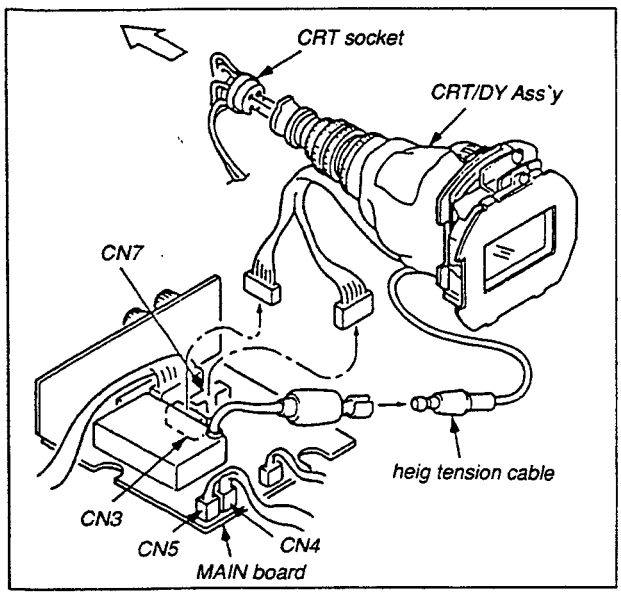
2. Remove the slide ring shown in Figure.
   Remove a screw and remove the CRT/DY ASS'Y from outside holders B and T.



3. Untie three strings and remove an adhesive tape and cable holder.

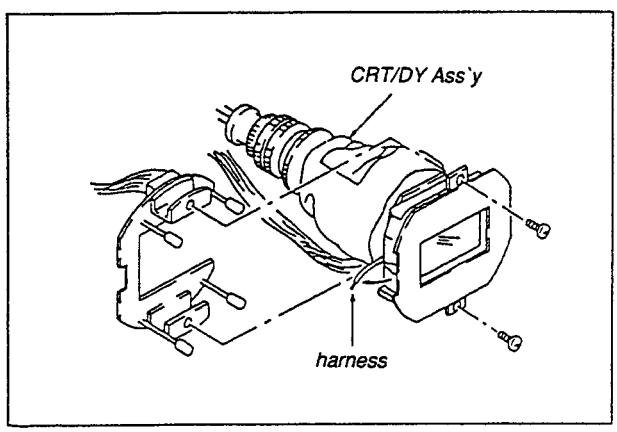


4. (Serial No.: 21001 and higher (for DXF-501(UC))
(Serial No.: 55001 and higher (for DXF-501CE(EK))
Disconnect four connectors CN3, 4, 5 and 7 on the MAIN board and high-tension cable. Disconnect the CRT socket from the CRT/DY ASS'Y.

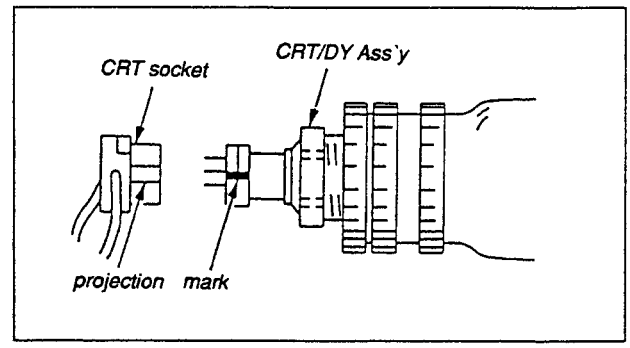


(Note) In disconnecting, carefully pull the CRT socket backward, as the pins of CRT/DY ASS'Y is liable to bend.

5. Unsolder the harness shown in Figure.
Remove two screws and remove the LED board from the CRT/DY ASS'Y.
(Note) When removing the LED board, be careful not to damage four LEDs (light-emitting diodes) on the LED board.



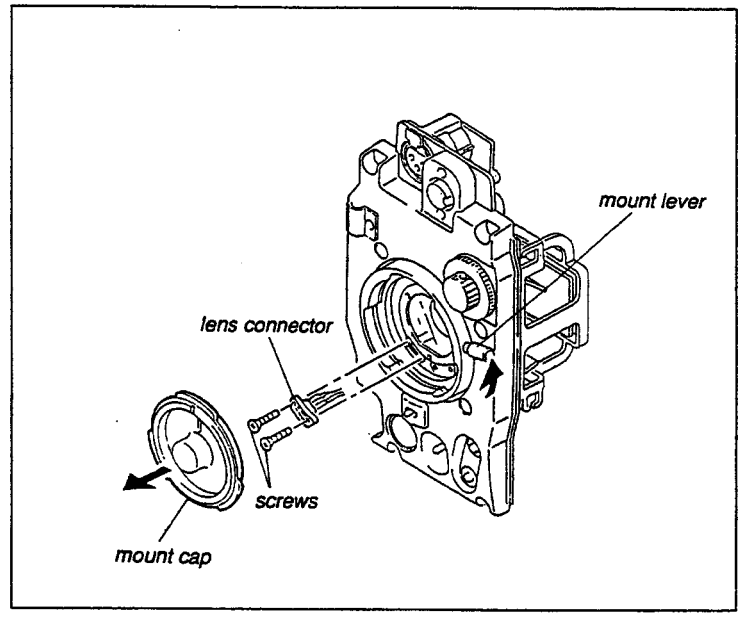
6. When installing a new CRT/DY ASS'Y, reverse the procedures above.
(Note) In reconnecting the CRT socket, be sure to match a projection of the CRT socket with a mark of the CRT/DY ASS'Y.



4-4. REPLACEMENT OF LENS CONNECTOR

Replacement procedure:

(1) Carry out Section 4-2 Replacement of the CCD unit, procedures 1 to 5 to remove the Front Panel Assembly.
(2) Move the mount lever in the direction of the arrow and remove the mount cap.
(3) Remove the two screws and remove the lens connector with harness.
(4) Replace the lens connector with harness with a new one.
Install it in the reverse order of removal.



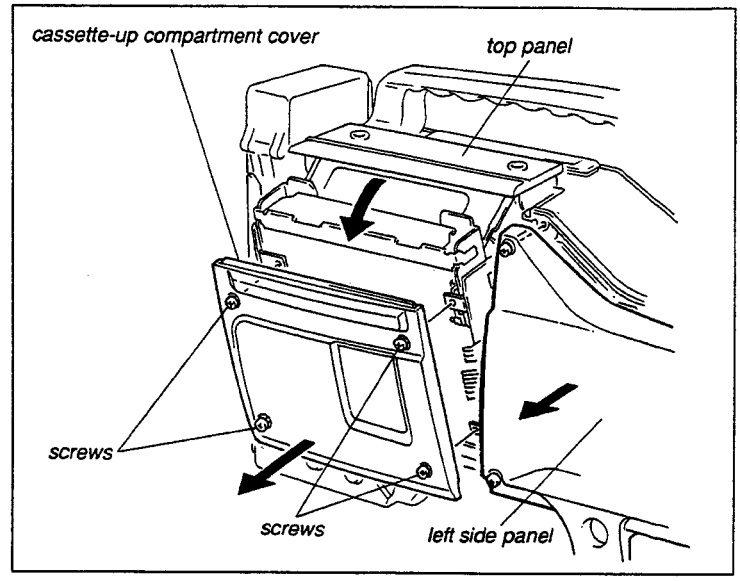
4-5. REPLACEMENT OF CASSETTE-UP COMPARTMENT

Mode: EJECT

Replacement procedure:

(1) Loosen the screw shown in the figure and remove the cover of the Cassette-up Compartment and the left side panel.

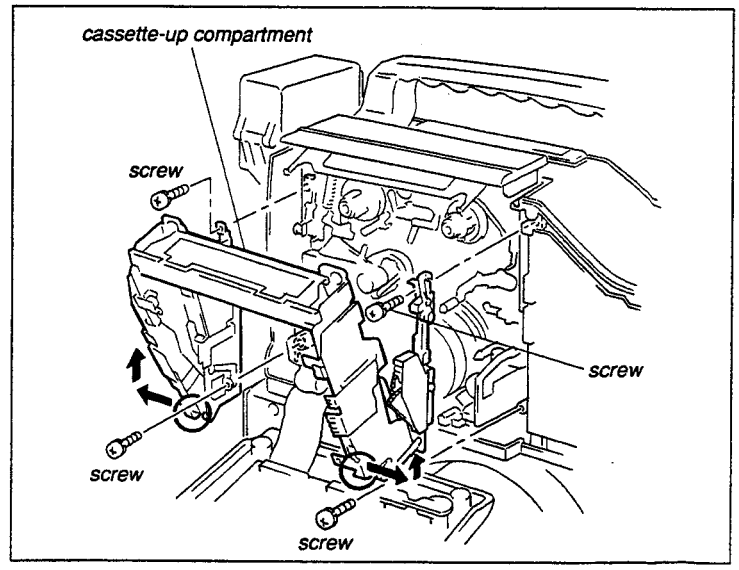
(Note) The AU Board is attached to the cover of the Cassette-up Compartment and the two flexible cables are connected to this AU Board. Be careful not to damage them.



(2) Remove the four screws attaching the Cassette-up Compartment, move the compartment in the direction of the arrow and remove it.

(3) Attach the new Cassette-up Compartment in the reverse order of steps (1) and (2).

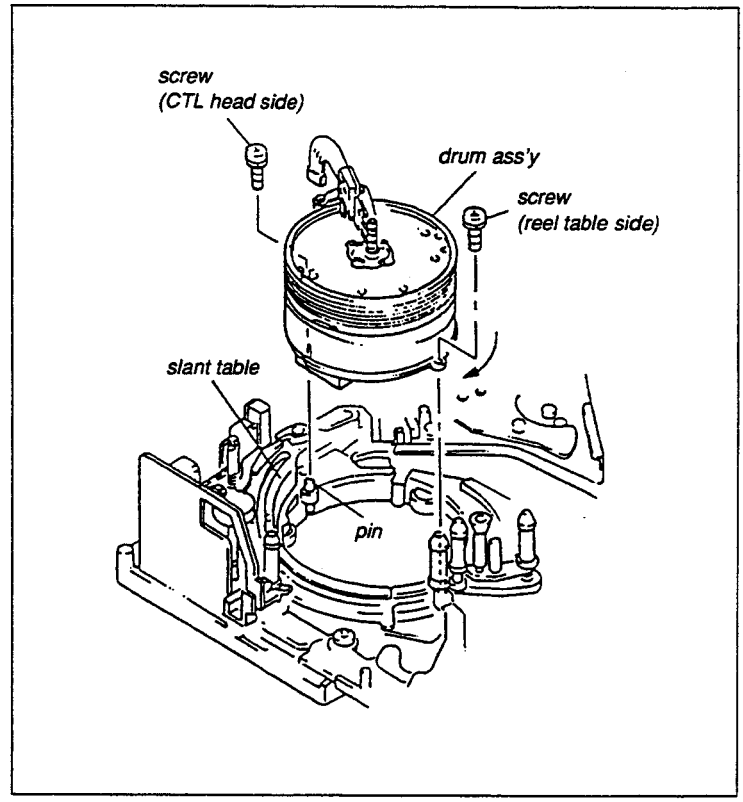
(4) Close the cover of the Cassette-up Compartment and check that the top panel descends smoothly.



4-6. REPLACEMENT OF THE DRUM ASSEMBLY

Tool: Tweezers
Mode: EJECT
Replacement procedure:

(1) Disconnect the flexible board (FL-54 Board) of the Slip Ring which is connected to CN28 on the MB-506 Board with a pair of tweezers. (Refer to Section 2-11.)
(2) Remove the two fixing screws of the Drum Assembly and remove the Drum Assembly from the unit. When removing, raise the Drum Assembly straightly up because the connectors at the bottom of the drum are inserted in CN650 and CN651 of the DR-254 Board.
(3) Install the new Drum Assembly in the unit so that the Slant Table Pin is inserted into the hole of the new Drum Assembly.
(4) Push the Drum Assembly against the direction of arrow so that the Drum Assembly is free of play and tighten the fixing screw at the Reel Table side. Then tighten the fixing screw at the CTL Head side.
(5) Insert and lock the flexible board (FL-54 Board) of the Slip Ring into connector CN28 on the MB-506 Board with tweezers. (Refer to Section 2-11.)
(6) After replacement, perform the adjustments in Section 4-42.



4-7. REPLACEMENT OF THE UPPER DRUM ASSEMBLY

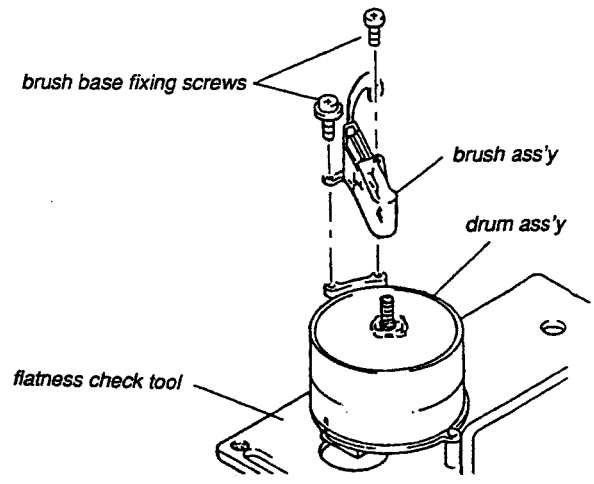
• When replacing the Upper Drum Assembly, be careful not to touch the Video Head.

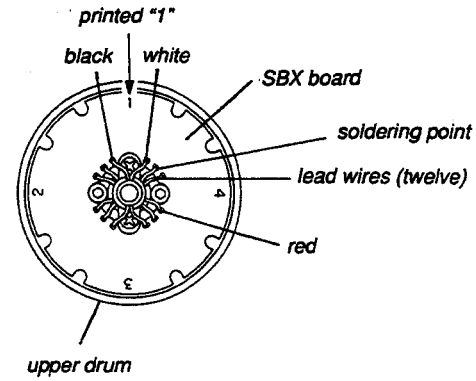
Tool: Flatness check tool
Drum eccentricity gauge (3)
Drum eccentricity gauge (2)
Drum eccentricity gauge (6)
Tweezers
L-shaped hexagonal wrench (across flat has 1.5mm)

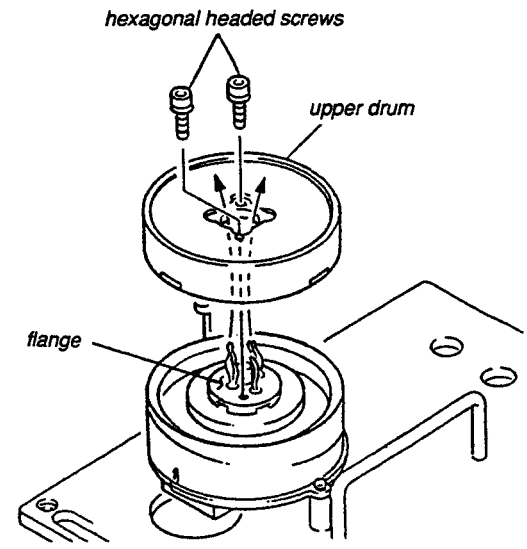
Mode: EJECT

Replacement procedure:

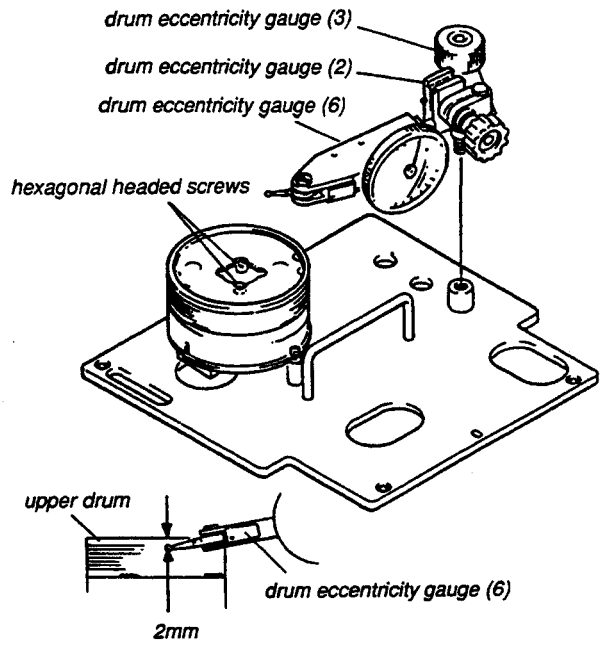
(1) Remove the Drum Assembly from the unit as described in Steps (1) and (2) in Section 4-6.
(2) Install the Drum Assembly on the flatness check tool.
(3) Remove the two brush base fixing screws and remove the Brush Assembly from the Drum Assembly.
(4) Disconnect the twelve lead wires soldered onto the SBX Board.
(5) Remove the Slip Ring Assembly as described in Section 4-8.
(6) Remove the two hexagonal headed screws from the Upper Drum Assembly with the L-shaped hexagonal wrench, then remove the Upper Drum Assembly from the Drum Assembly.
(7) Pass the eight lead wires from the flange through the upper drum assembly and place the new upper drum assembly on the flange. The red lead wire should face the direction shown in the figure.
(8) Thread the hexagonal headed screws on the new Upper Drum Assembly to the flange snugly but do not tighten.

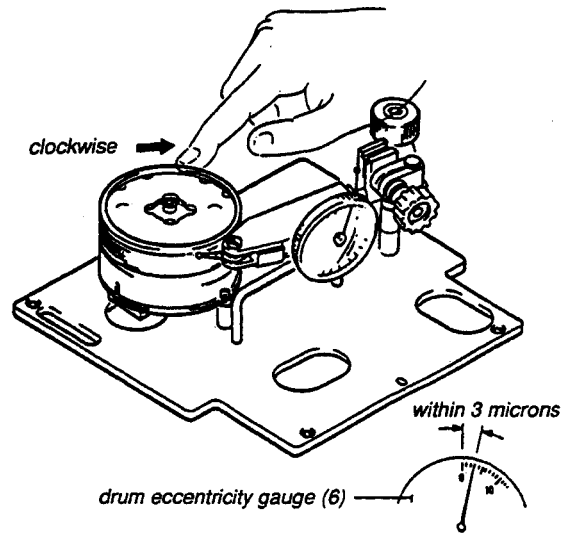


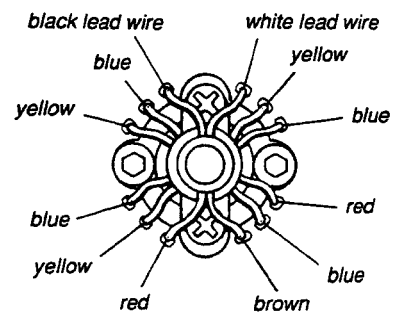




(9) Assemble the drum eccentricity guages (3),(2),(6), and install them on the flatness check tool.
(10) Adjust the position of gauge so that the tip probe is positioned at the point about 2mm from the top edge of the Upper Drum.
(11) Turn the Upper Drum Assembly slowly clockwise and confirm that the pointer deflection of the gauge is within 3 microns during one complete turn.
If the specification is satisfied, perform Step(13) and later. If not, Perform Step (12) and later.
(12) To satisfy the specification, adjust the position of the upper drum assembly by moving it manually.
(13) After adjustment, alternately tighten the two hexagonal headed screws.
(14) Confirm that the specification is satisfied once again.
(15) Solder the eight lead wires from the flange to the SBX board.
(16) Install the Slip Ring Assembly removed in Step (5) as described in Section 4-8.
(17) Install the Brush Assembly.
(18) Perform the Brush Position Adjustment in Section 6-16-1.
(19) Remove the Drum Assembly from the flatness check tool.
(20) Perform steps (3) through (6) in Section 4-6.



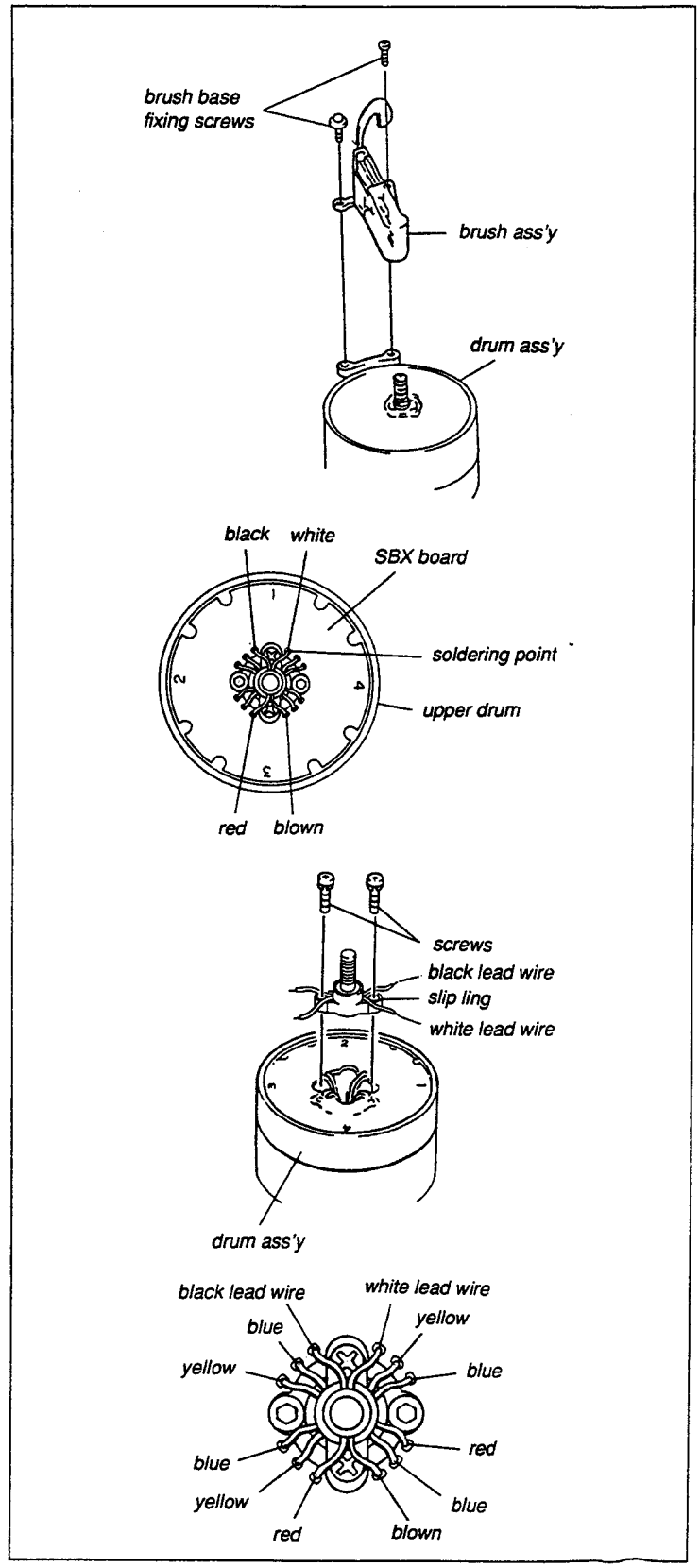




4-8. REPLACEMENT OF THE SLIP RING ASSEMBLY

Tool: Tweezers
Mode: EJECT
Replacement procedure:

(1) Disconnect the flexible board (FL-54 Board) of the Slip Ring which is connected to CN28 on the MB-506 Board with a pair of tweezers. (Refer to Section 2-11.)
(2) Remove the two brush base fixing screws and remove the Brush Assembly from the unit.
(3) Desolder the four lead wires of the Slip Ring from the SBX Board of the Upper Drum Assembly.
(4) Remove the two screws of the Slip Ring, then remove the Slip Ring from the unit.
(5) Arrange the black and white lead wires of the new Slip Ring so that they are facing the side of the SBX Board with the silk screen printed "1", and put on the Drum Assembly.
(6) Install the Slip Ring onto the Drum Assembly with the two screws.
(7) Solder the four lead wires on the SBX Board as shown in the figure.
(8) Install the Brush Assembly.
(9) Perform the Brush Position Adjustment in Section 6-16-1.
(10) Install and lock the flexible board (FL-54 Board) of the Slip Ring into CN28 on the MB-506 Board with tweezers. (Refer to Section 2-9.)

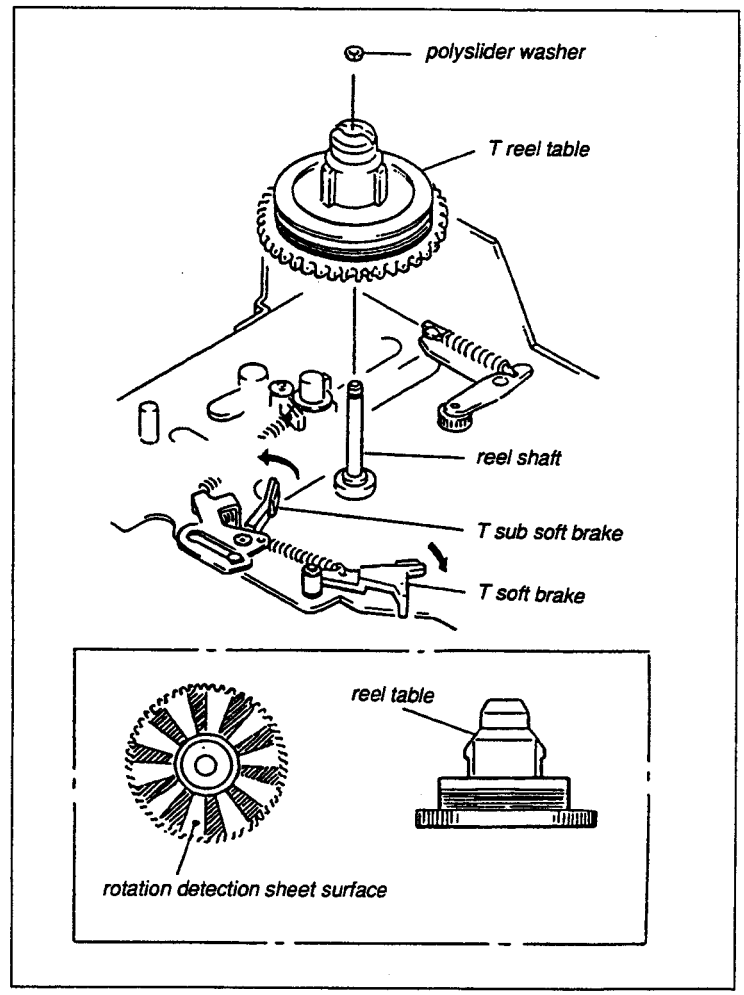


4-9. REPLACEMENT OF THE TAKE-UP SIDE REEL TABLE

Mode: EJECT

Replacement:

(1) Remove the Brake Slider referring to Section 4-17.
(2) Remove the polyslider washer at the top of the T Reel Table.
(3) Release the pressures of the T Sub Soft Brake and T Soft Brake from the T Reel Table while pressing them in the direction of the arrows, and remove the T Reel Table from the unit.
(4) Clean the reel shaft with a cleaning piece moistened with cleaning fluid.
(5) Clean the Rotation Detection Sheet surface of the new T Reel Table and the reel table's outer circumference with a cleaning piece moistened with cleaning fluid.
(6) Release the T Sub Soft Brake and T Soft Brake as in Step (3), insert the T Reel Table onto the Reel Shaft, and fasten it with the 1.2mm diameter polyslider washer.
(7) While releasing the T Sub Soft Brake, rotate the T Reel Table by hand to check that it rotates smoothly.
(8) Install the Brake Slider referring to Section 4-17.
(9) After replacement, while releasing the T Soft Brake and T Sub Soft Brake, rotate the T Reel Table, and check that it rotates smoothly.

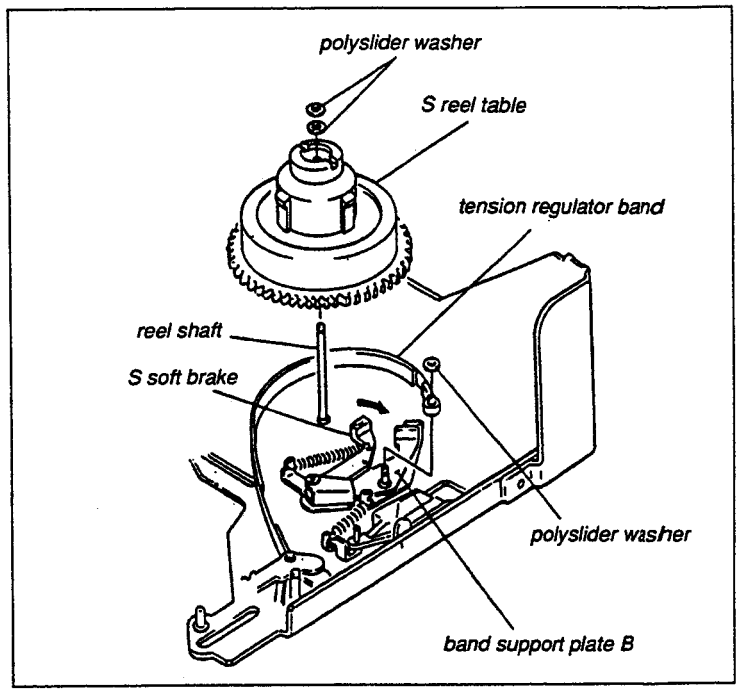


4-10. REPLACEMENT OF THE SUPPLY SIDE REEL TABLE

Mode: EJECT

Replacement procedure:

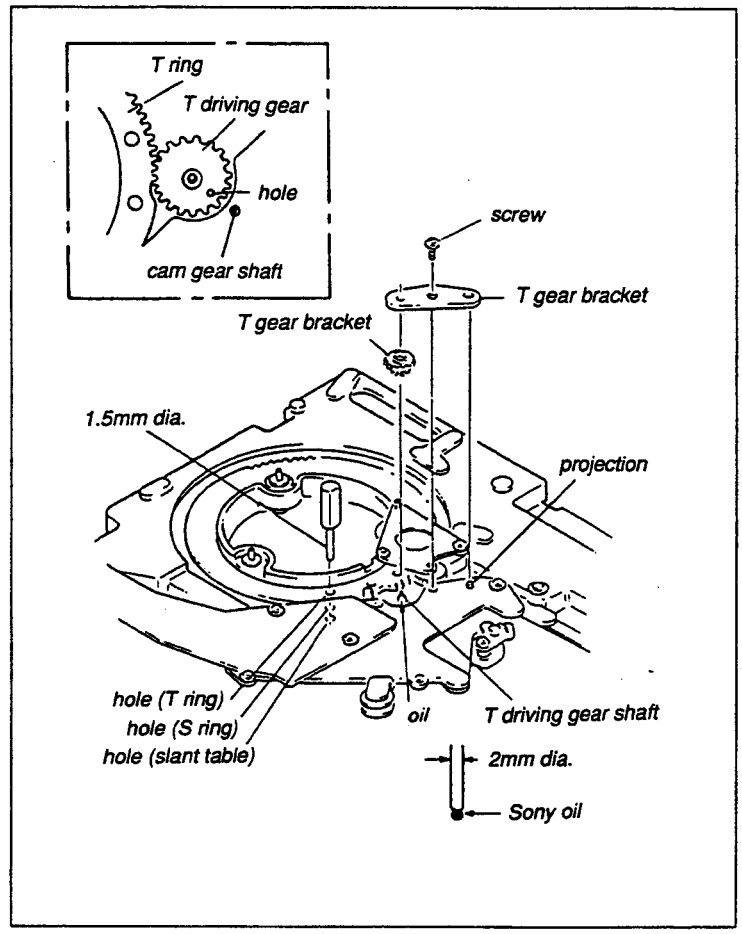
(1) Remove the polyslider washer (shown in the figure) fixing the Tension Regulator Band.
(2) Remove the polyslider washer at the top of the S Reel Table.
(3) Release the pressure of the S Soft Brake from the S Reel Table while pressing it in the direction of the arrow, and remove the S Reel Table from the unit.
(4) Clean the reel shaft with a cleaning piece moistened with cleaning fluid.
(5) Clean the Rotation Detection Sheet surface of the a new S Reel Table and the reel table's outer circumference with a cleaning piece moistened with cleaning fluid.
(6) Release the S Soft Brake as in Step (3), insert the S Reel Table onto the reel shaft, and fasten it with the 2mm diameter polyslider washer and the 1.2mm diameter polyslider washer.
(7) Insert the Tension Regulator Band onto the shaft of the Band Support B Assembly and fasten it with the 1.2mm diameter polyslider washer.
(8) After replacement, while releasing the S Soft Brake, rotate the S Reel Table by hand to check that it rotates smoothly.
(9) After replacement, perform the adjustments in Section 4-42.



4-11. REPLACEMENT OF THE TAKE-UP SIDE DRIVING GEAR

Tool: 1.5mm diameter rod
Mode: EJECT
Replacement procedure:

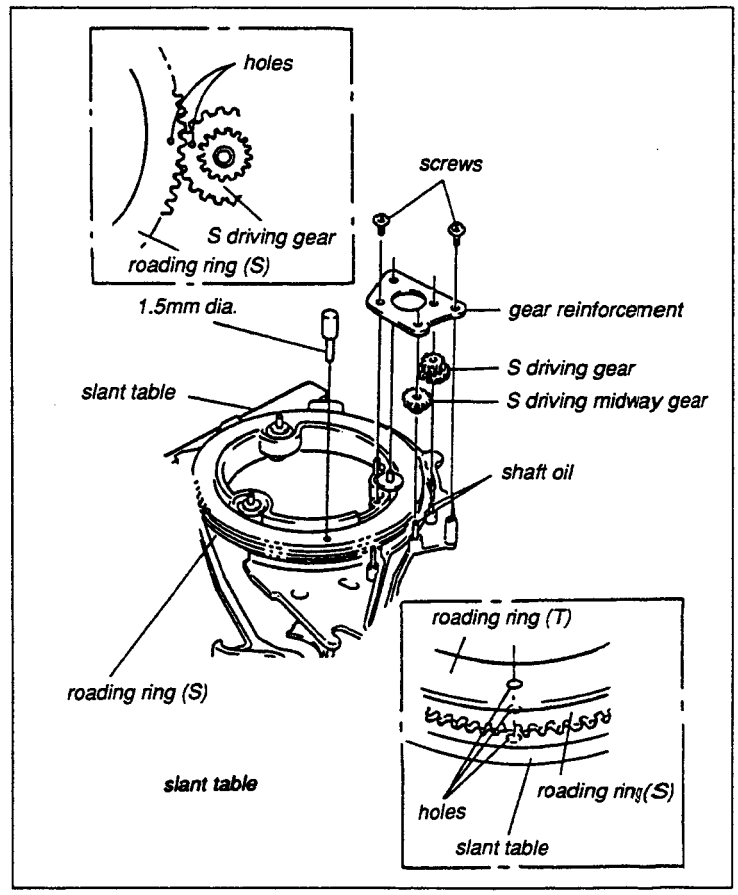
(1) Remove the SS-57 Board. (Refer to Section 2-9-7.)
(2) Remove the shield plate. (Refer to Section 4-39.)
(3) Remove a fixing screw of the T Gear Bracket and remove the T Gear Bracket and T Driving Gear from the back of the Mechanical Deck Block.
(4) Clean the T Driving Gear Shaft with a cleaning piece moistened with cleaning fluid.
(5) Apply a half drop of Sony oil on the above shaft. (One drop of Sony oil is about amount that remains on the tip of 2mm diameter rod dipped in oil.)
(6) Align the three holes (1.5mm dia.) of the Threading Ring (take-up side), Threading Ring (supply side), and Slant Table, then pass a rod (1.5mm dia.) through the holes.
(7) Insert the T Driving Gear onto the shaft so that the positional relationship between the T Driving Gear hole and Cam Gear Shaft are aligned as shown in the detail figure.
(8) Install the T Gear Bracket with a fixing screw.
(9) Repeat threading and unthreading two or three times and check that they can be done smoothly.



4-12. REPLACEMENT OF THE SUPPLY SIDE DRIVING GEAR

Tool: 1.5mm diameter rod
Mode: EJECT
Replacement procedure:

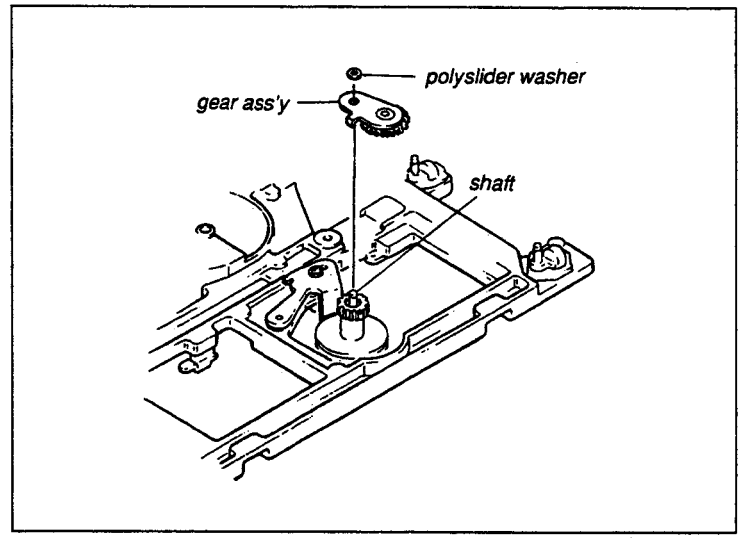
(1) Remove the SS-57 Board. (Refer to Section 2-9-7.)
(2) Remove the shield plate. (Refer to Section 4-39.)
(3) Remove the two fixing screws of the Gear Reinforcement, and then remove the Gear Reinforcement, S Driving Midway Gear, and S Driving Gear from the back of the Mechanical Deck Block.
(4) Clean the S Driving Midway Gear and S Driving Gear Shafts with a cleaning piece moistened with cleaning fluid.
(5) Apply a half drop of Sony oil on the above two shafts.
(6) Align the three holes (1.5mm dia.) of the Threading Ring (take-up side), Threading Ring (supply side), and Slant Table, then pass one rod (1.5mm dia.) through the holes.
(7) Insert the S Driving Gear onto the shaft so that the positional relationship between the S Driving Gear hole and Threading Ring (supply side) hole are aligned as shown in the detail figure.
(8) Insert the S Driving Midway Gear and install the Gear Reinforcement with two fixing screws.
(9) Repeat threading and unthreading two or three times and check that they can be done smoothly.



4-13. REPLACEMENT OF THE GEAR ASSEMBLY

Mode: EJECT
Replacement procedure:

(1) Remove the polyslider washer at the top of the Gear Assembly.
(2) Clean the shaft of the Gear Assembly with a cleaning piece moistened with cleaning fluid.
(3) Insert the new Gear Assembly onto the shaft, push a polyslider washer onto the shaft, and fasten the Gear Assembly.
(4) Perform the PLAY, F.FWD, and REW operations two or three times and check that they can be done smoothly.
(5) After replacement, perform the Gear Assembly Position Adjustment in Section 5-1.

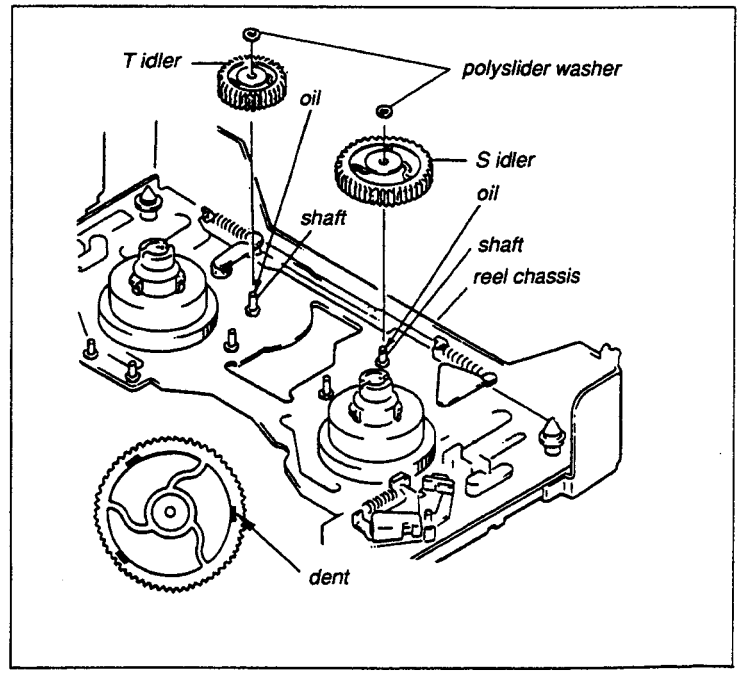


4-14. REPLACEMENT OF THE SUPPLY/TAKE-UP SIDE IDLER

- Since the S and T Idlers are replaced in the same manner, only replacement of the S Idler is described below.

Mode: EJECT
Replacement procedure:

(1) Remove the polyslider washer and remove the S Side Idler from the unit.
(2) Clean the Reel Shaft with a cleaning piece moistened with cleaning fluid.
(3) Apply an 1/4 drop of Sony oil on the shaft.
(4) As shown in the figure, install the S Idler in the unit with the S Idler surface's three dents faced to the reel chassis.
(5) Fasten the S Idler with the 1.2mm diameter polyslider washer.

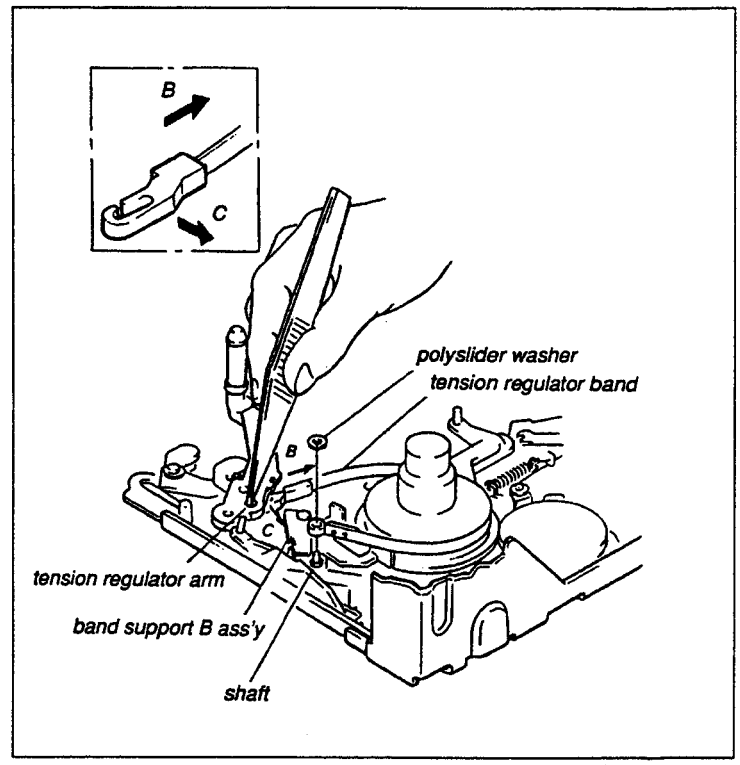


4-15. REPLACEMENT OF THE TENSION REGULATOR BAND

• When replacing the Tension Regulator Band, be careful not to touch or bend the band felt portion.

Tool: Tweezers
Mode: Theading end
Replacement procedure:

(1) Put the unit into the threading end mode. (Refer to Section 4-1.)
(2) Remove the polyslider washer shown in the figure.
(3) Push the Arm Hook of the Tension Regulator Band in the opposite direction of the arrow B.
(4) Insert twezzers into the hole of the Tension Regulator Arm shown in the figure, and hold the hook and push it in the direction of the arrow C, then remove the Tension Regulator Band.
(5) Insert the hook of a new Tension Regulator Band into the lower portion of the Tension Arm in the direction indicated by the figure and push the hook in the opposite direction of the arrow C to lock it to the pin.
(6) Pull the hook of the Tension Regulator band in the direction of the arrow B.
(7) Taking care not to bend the Tension Regulator Band, wind it around the S Reel.
(8) Insert another hook of the Tension Regulator Band onto the shaft of the Band Support B Assembly and fasten it with 1.2mm diameter polyslider washer onto the shaft.
(9) After replacement, perform the adjustments in Section 4-42.



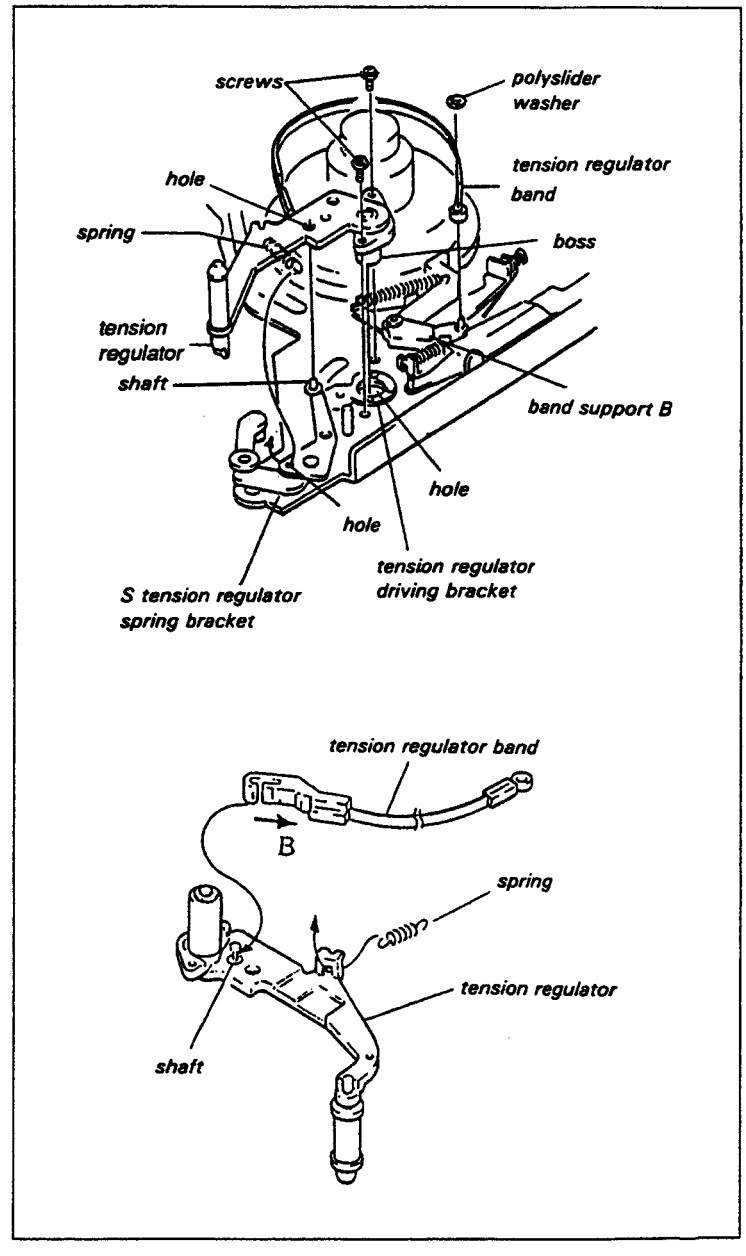
4-16. REPLACEMENT OF THE TENSION REGULATOR

- When replacing the Tension Regulator, remove the Tension Regulator Band from the unit. Be careful not to touch or bend the band felt portion.

Mode: EJECT

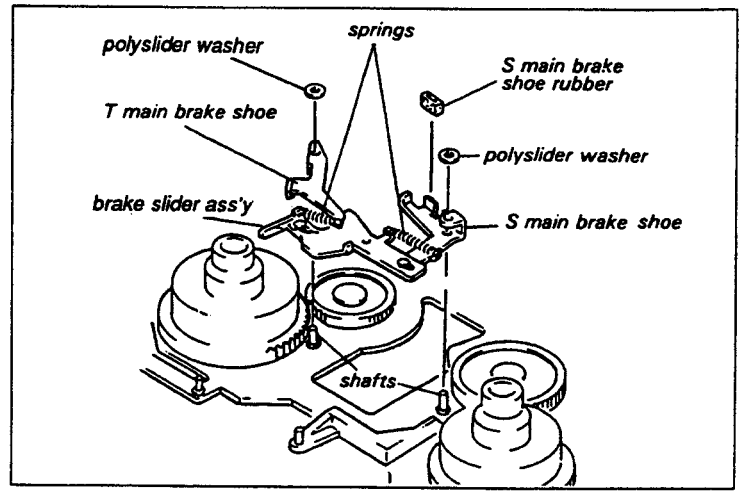
Replacement procedure:

(1) Remove the polyslider washer fixing the Tension Regulator Band.
(2) Remove the spring shown in the figure from the S Tension Regulator Spring Bracket.
(3) Remove the two fixing screws of the Tension Regulator and remove the Tension Regulator from the unit.
(4) Remove the spring (removed in Step (2)) from the removed Tension Regulator and install it on the new Tension Regulator in the direction as shown in the figure.
(5) Remove the Tension Regulator Band from the removed Tension Regulator and install it on the new Tension Regulator in the direction shown in the figure. After installation, pull the band in the direction of the arrow B.
(6) Align the hole of the Tension Regulator Driving Bracket with the reel chassis hole.
(7) Insert the Tension Regulator Boss into the reel chassis hole. Adjust the Tension Regulator position so that the Driving Bracket Shaft is inserted into the illustrated hole of the Tension Regulator.
(8) Install the Tension Regulator with the two screws.
(9) Install the spring (removed in Step (2)) on the S Tension Regulator Spring bracket in the direction as shown in the figure.
(10) Being careful not to bend the Tension Regulator Band, wind it around the S Reel.
(11) Insert the other hook of the band onto the shaft of the Band Support B Assembly and insert the 1.2mm diameter polyslider washer onto the shaft.
(12) After replacement, perform the adjustments in Section 4-42.



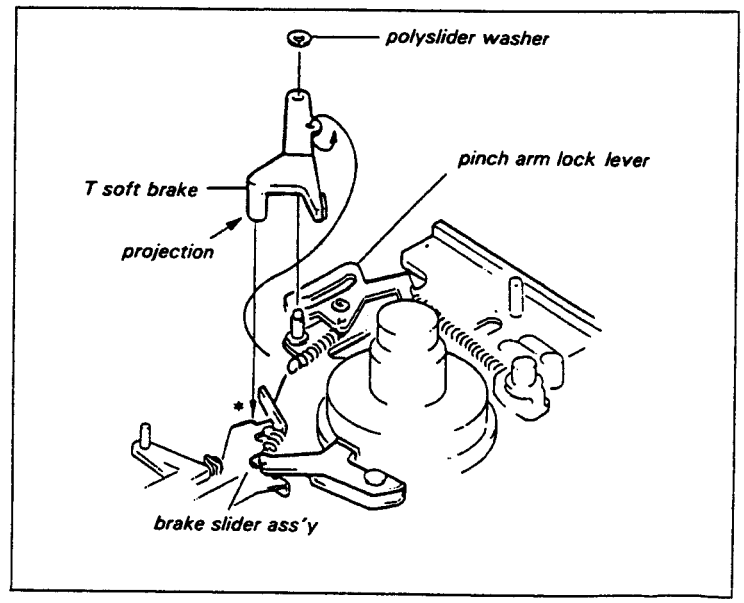
4-17. REPLACEMENT OF THE MAIN BRAKE SHOE

Mode: EJECT
Replacement procedure:
(1) Remove the T or S Brake Shoe Rubber.
(2) Install the new Brake Shoe Rubber.



4-18. REPLACEMENT OF THE TAKE-UP SIDE SOFT BRAKE

Mode: EJECT
Replacement procedure:
(1) Remove the spring from the Pinch Arm Lock Lever which is hooked to the T Soft Brake.
(2) Remove the polyslider washer and remove the T Soft Brake from the unit.
(3) Install the T Soft Brake to the unit so that the projection of the new T Soft Brake is positioned to the * marked portion of the Brade Slider Assembly, insert the 1.2mm diameter polyslider washer onto the shaft, and fasten the T Soft Brake.
(4) Hook the spring of the Pinch Arm Lock Lever to the T Soft Brake.

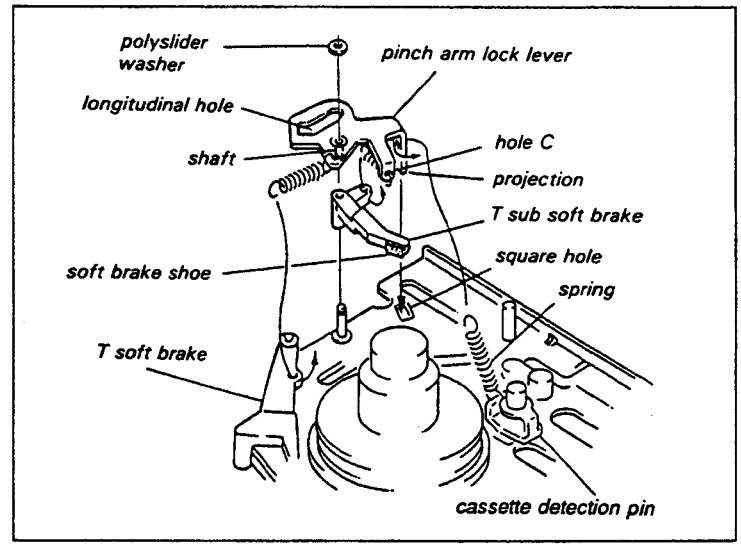


4-19. REPLACEMENT OF THE TAKE-UP SIDE SUB SOFT BRAKE

Mode: EJECT

Replacement procedure:

(1) Remove the spring from the Pinch Arm Lock Lever which is hooked to the T Soft Brake.
(2) Remove the spring from the Cassette Detection Pin which is hooked to the Pinch Arm Lock Lever.
(3) Remove the polyslider washer fixing the Pinch Arm Lock Lever and remove the Lock Lever from the unit.
(4) Remove the spring from the T Sub Soft Brake which is hooked on hole C of the Pinch Arm Lock Lever.
(5) Remove the spring from the T Sub Soft Brake and hook it on the new T Sub Soft Brake in the direction as shown in the figure.
(6) Insert the T Sub Soft Brake onto the shaft of the Pinch Arm Lock Lever and hook the spring as shown in the figure.
(7) Install the Pinch Arm Lock Lever on the unit so that the projection of the Pinch Arm Lock Lever is inserted into the Square hole of the reel chassis, the T Sub Soft Brake Shoe touches the reel table, and the Pinch Arm Roller is inserted into the longitudinal hole of the Lock Lever.
(8) Insert the 1.2mm diameter polyslider washer onto the shaft and fasten the Lock Lever.
(9) Hook the spring which is removed in Steps (1) and (2).

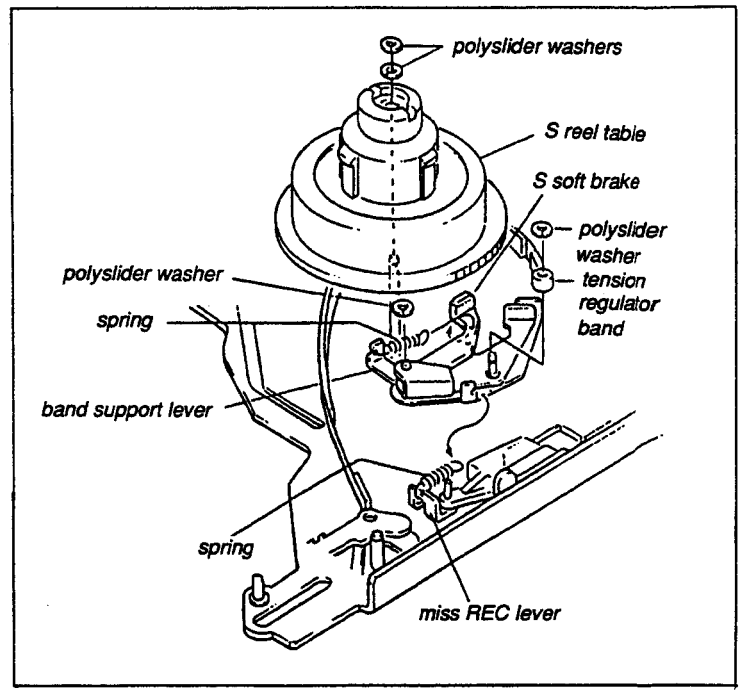


4-20. REPLACEMENT OF THE SUPPLY SIDE SOFT BRAKE

Mode: EJECT

Replacement procedure:

(1) Remove the polyslider washer (shown in the figure) fixing the Tension Regulator Band.
(2) Remove the polyslider washer at the top of the S Reel Table.
(3) Remove the S Reel Table from the unit while releasing the pressure against the S Reel Table of the S Soft Brake.
(4) Remove the spring from the Miss REC Lever B hooked on the Band Support Lever.
(5) Remove the polyslider washer shown in the figure and remove the Band Support Lever from the unit.
(6) Remove the spring from the S Soft Brake.
(7) Install the new S Soft Brake and hook the spring removed in Step 4 in the direction as shown in the figure.
(8) Assemble the S Soft Brake by reversing the Steps (1) through (5).



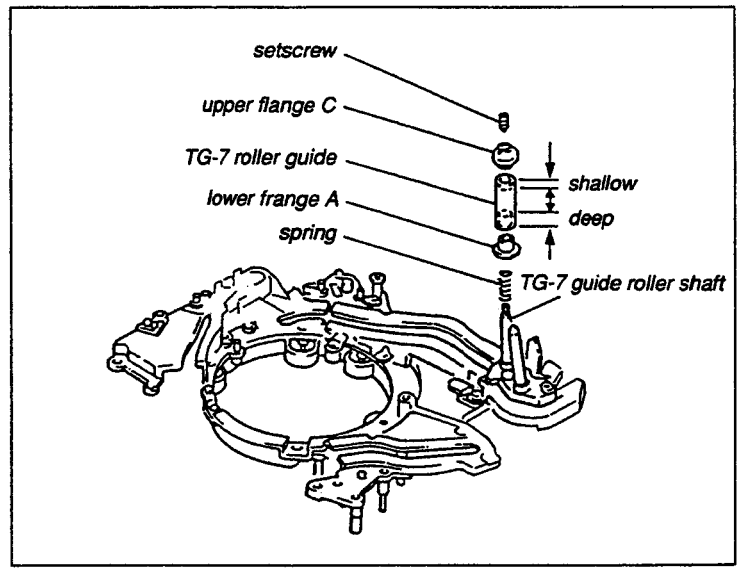
4-21. REPLACEMENT OF THE COMPONENT PARTS OF TAKE-UP SIDE BASE

- Replacement of the TG-7 (guide roller) on the T Base differs from replacement of the other components.
- Refer to Section 4-21-1 for replacement the TG-7, and refer to Section 4-21-2 for other components.

4-21-1. Replacement of the TG-7

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

(1) Loosen the setscrew at the top of the TG-7 with the tape guide adjustment screwdriver.
(2) Remove the Upper Flange C.
(3) Remove the TG-7 Roller Guide TG-7, the Lower flange A, and the compression spring.
(4) Clean the TG-7 Guide Roller Shaft with a cleaning piece moistened with cleaning fluid.
(5) Insert the compression spring removed in Step (3) onto the TG-7 Guide Roller Shaft.
(6) Carefully insert the Lower Flange A and TG-7 Guide Roller onto the TG-7 Guide Roller Shaft in the direction as shown in the figure.
(7) Install the Upper Flange C.
(8) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(9) After replacement, perform the adjustments in Section 4-42.



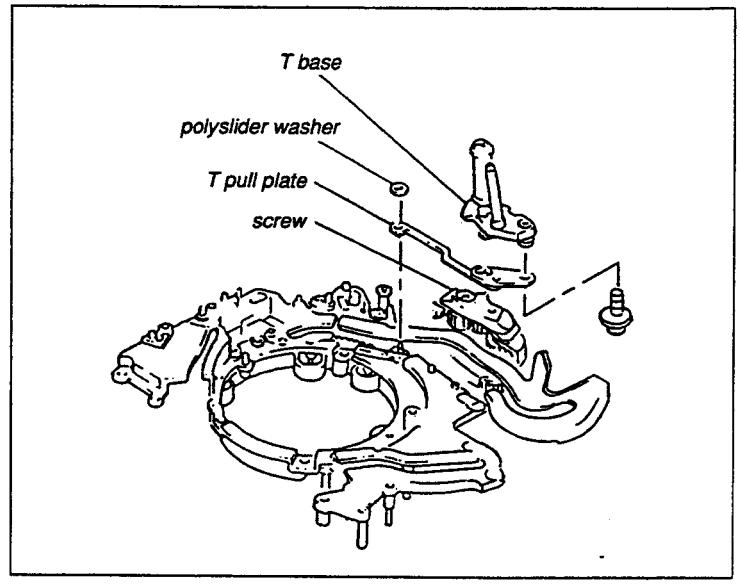
4-21-2. Replacement of the Component Parts of the Take-up Side Base

- For replacement of the TG-7 on the T Side Base, refer to Section 4-21-1.
- When replacing the components other than TG-7 on the T Side Base, remove the Drum from the unit once so as not to damage it.

Mode: Turn the screw shown in the figure so that the Take-up Side Base reaches the end of the Take-up Side Rail (I).

Replacement procedure:

(1) Remove the Drum Assembly from the unit. (Refer to Section 4-6.)
(2) Turn the screw and set the Take-up Side Base in the position described above.
(3) Remove the Take-up Side Rail(I). (Refer to Section 4-43.)
(4) Remove the polyslider washer fixing the Take-up Side Pull Plate and remove the Take-up Side Base from the unit.
(5) Replace the faulty component which constitutes the Take-up Side Base.
(6) Assemble the Take-up Side Base by reversing the Steps (1) through (4).
(7) After replacement, perform the adjustments in Section 4-42.



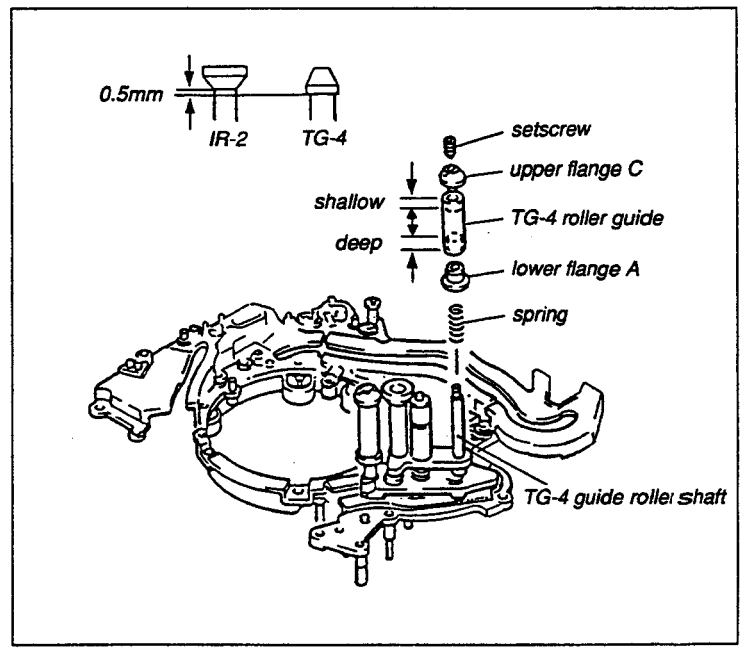
4-22. REPLACEMENT OF THE COMPONENT PARTS OF THE SUPPLY SIDE BASE

- Replacement of the S Sub Base,TG-4, TG-5, and IR-2 (impedance roller guide) on the S Base differs from replacement of the other components.
- Refer to Section 4-22-1 for TG-4, Section 4-22-2 for TG-5, Section 4-22-3 for IR-2, Section 4-22-4 for S Sub Base, and Section 4-22-5 for replacing the other components.

4-22-1. Replacement of the TG-4

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

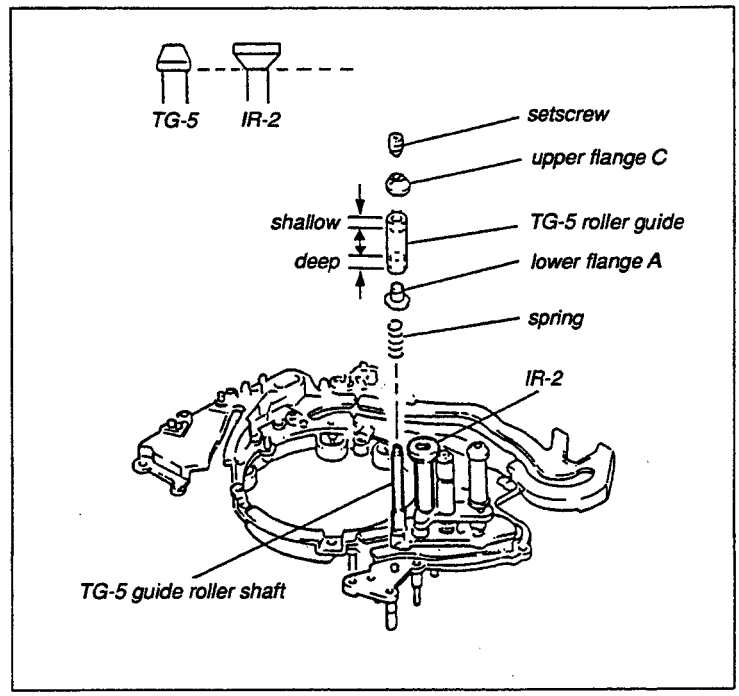
(1) Loosen the setscrew at the top of the TG-4 with the tape guide adjustment screwdriver.
(2) Remove the Upper Flange C.
(3) Remove the TG-4 Roller Guide, Lower Flange A, and the compression spring.
(4) Clean the TG-4 Guide Roller Shaft with the cleaning piece moistened with cleaning fluid.
(5) Insert the compression spring removed in Step (3) onto the TG-4 Guide Roller Shaft.
(6) Carefully insert the Lower Flange A and TG-4 Roller Guide onto the TG-4 Guide Roller Shaft in the direction as shown in the figure.
(7) Install the Upper Flange C, and adjust the position of the TG-4 Roller Guide so that the lower end of the Upper Flange of the TG-4 Guide Roller is about 0.5mm lower than the lower end of the IR-2 Guide Upper Flange.
(8) Tighten the setscrew at the top of the guide using a tape guide adjustment screwdriver.
(9) After replacement, perform the adjustments in Section 4-42.



4-22-2. Replacement of the TG-5

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

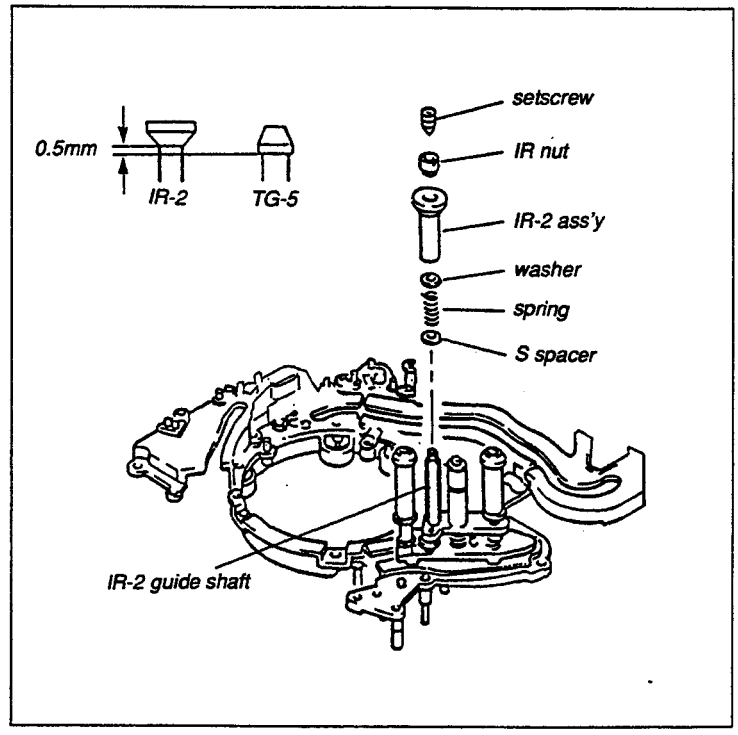
(1) Loosen the setscrew at the top of TG-5 with the tape guide adjustment screwdriver.
(2) Remove the Upper Flange C.
(3) Remove the TG-5 Roller Guide, Lower Flange A, and the compression spring.
(4) Clean the TG-5 Guide Roller Shaft with a cleaning piece moistened with cleaning fluid.
(5) Insert the compression spring removed in Step (3) onto the TG-5 Guide Roller Shaft.
(6) Carefully insert Lower Flange A and the TG-5 Roller Guide onto the TG-5 Guide Roller Shaft in the direction as shown in the figure.
(7) Install the Upper Flange C, and adjust the position of the TG-5 Guide Roller so that the lower end of the Upper Flange is the same in height as the lower end of the IR-2 Guide Upper Flange as viewed.
(8) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(9) After replacement, perform the adjustments in Section 4-42.



4-22-3. Replacement of the IR-2 Guide (Impedance Roller Guide)

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

(1) Loosen the setscrew at the top of the IR-2 Guide with the tape guide adjustment screwdriver.
(2) Remove the IR Nut.
(3) Remove the IR-2 Assembly, washer (1.4mm dia.), compression spring, and S Spacer from the IR-2 Guide Shaft.
(4) Clean the IR-2 Guide Shaft with a cleaning piece moistened with cleaning fluid.
(5) Install the S Spacer, compression spring, and washer (1.4mm dia.) removed in Step (3) onto the IR-2 Guide Shaft.
(6) Carefully insert the new IR-2 Assembly onto the IR-2 Guide Shaft.
(7) Install the IR Nut, and adjust the position of the IR-2 Guide so that the lower end of the IR-2 Guide Upper Flange is about 0.5mm higher than the lower end of the TG-5 Guide Upper Flange.
(8) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(9) After replacement, perform the adjustments in Section 4-42.

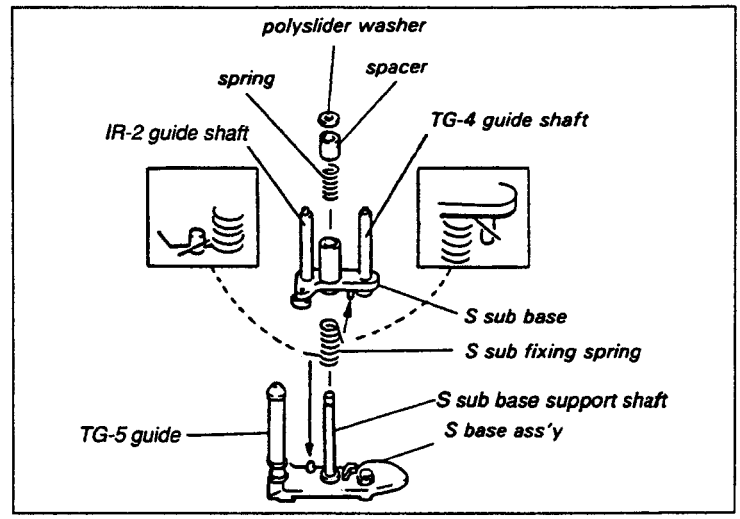


4-22-4. Replacement of the Supply Side Sub Base

- The TG-4 and IR-2 Guides are provided on the S Sub Base. When replacing the S Sub Base, replace the TG-4 and IR-2 Guides referring to Sections 4-22-1 and 4-22-3. Then, adjust the height with the TG-5 Guide as reference.

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

(1) Remove the polyslider washer at the top of the S Sub Base.
(2) Remove the spacer, compression spring, S Sub Base on which TG-4 and IR-2 Guide are installed, and S Sub Fixing Spring.
(3) Clean the new S Sub Base TG-4 Guide Shaft and IR-2 Guide Shaft with a cleaning piece moistened with cleaning fluid.
(4) Remove the TG-4 Guide Roller and IR-2 Impedance Roller from the S Sub Base removed in Step (2) and install them on the new S Sub Base.
(5) Clean the S Sub Base Support Shaft with acleaning piece moistened with cleaning fluid.
(6) Insert the S Sub Fixing Spring, S Sub Base(assembled in Step (4)), compression spring, and spacer onto the S Sub Base Support Shaft.
(7) Hook the S Sub Fixing Spring as shown in the figure.
(8) Insert the polyslider washer (1.5mm dia.) onto the top of the S Sub Base Shaft and fasten the S Sub Base.
(9) Adjust the height of the TG-4 and IR-2 Guides with the TG-5 Guide as reference. (Refer to Sections 4-22-1 and 4-22-3).
(10) After replacement, perform the adjustments in Section 4-42.



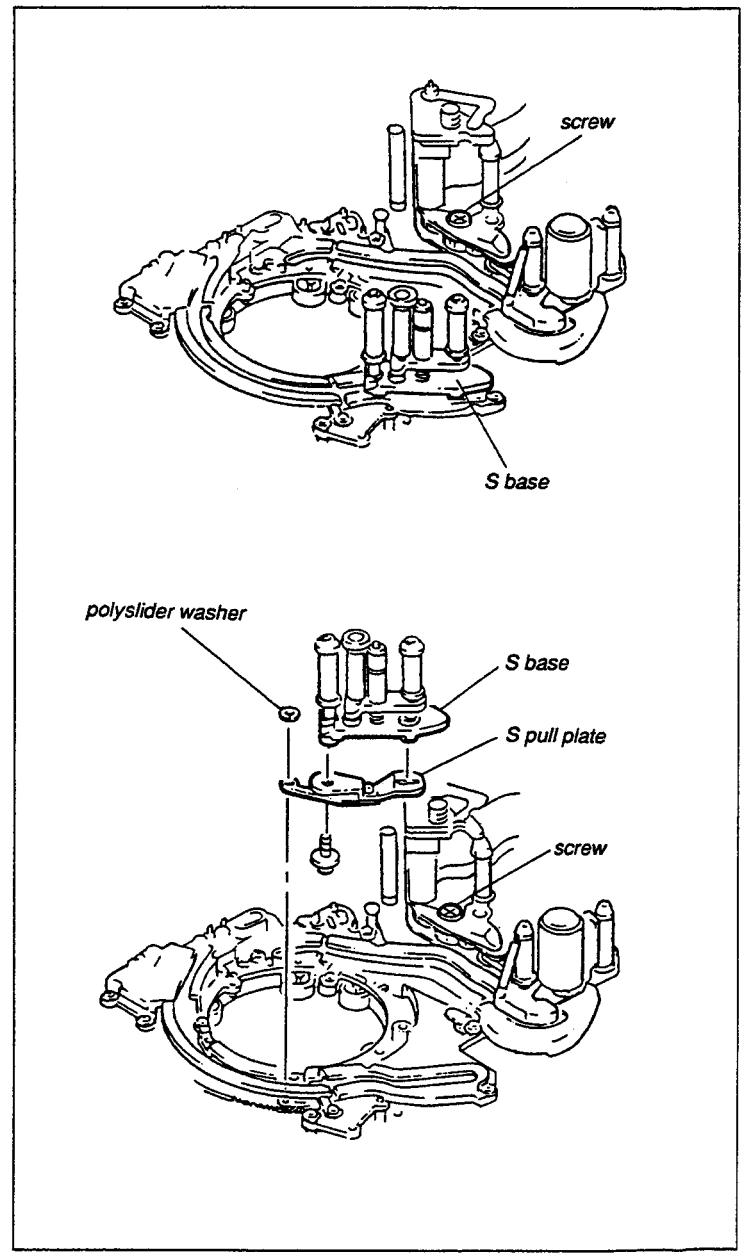
4-22-5. Replacement of the Component Parts of the Supply Side Base

- Refer to the appropriate section for replacing the TG-4, TG-5, and IR-2 Guides on the S Base.
- When replacing the components other than the above components on the S Base, remove the Drum Assembly from the unit so as not to damage it.

Mode: Turn the screw shown in the figure so that the S Side base reaches the end of the S Side rail.

Replacement procedure:

(1) Remove the Drum Assembly from the unit. (Refer to Section 4-6).
(2) Turn the screw and set the S Side Base in the position described above.
(3) Remove the S Side Rail (I). (Refer to Section 4-32).
(4) Remove the polyslider washer fixing the Supply Side Pull Plate and remove the S Side Base from the unit.
(5) Replace the faulty component which constitutes the S Side base.
(6) Assemble the S Side Base by reversing the Steps (1) through (4).
(7) After replacement, perform the adjustments in Section 4-42.



4-23. REPLACEMENT OF THE CTL HEAD BLOCK

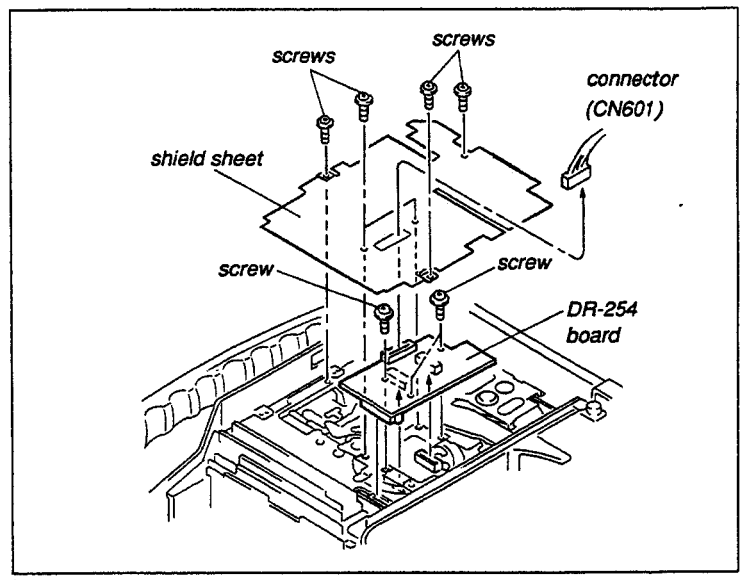
- The CTL Head Block consists of the CTL Head, Erase Head, FE-18 Board, IR-1 Guide (impedance roller guide), and tape guide. Replacement of the above components is described below.
- When replacing the CTL Head, Erase Head, and FE-18 Board, remove the CTL Head Block from the unit. The removal and installation are described below.

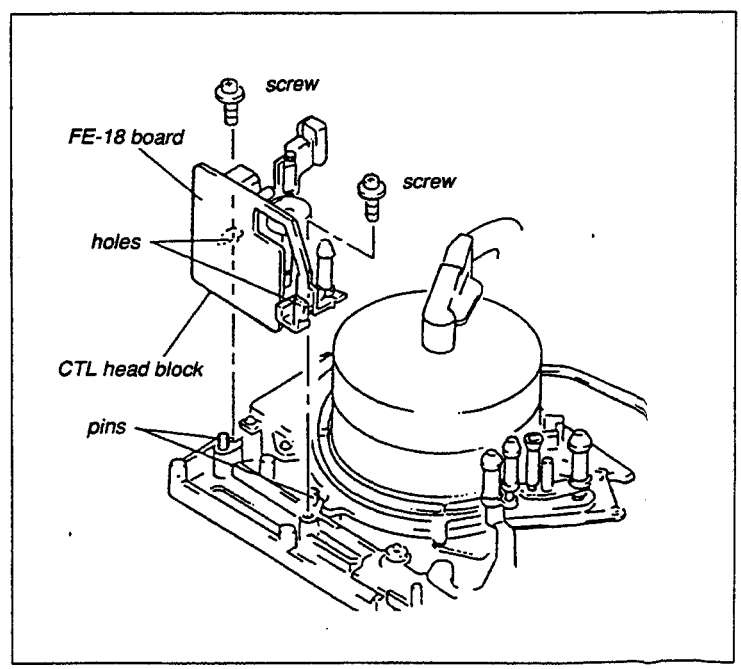
Mode: EJECT

Removal and installation:

- Remove the shield plate and the DR-254 board from the unit as shown in the figure.
- Remove the two fixing screws of the CTL Head Block and remove the CTL Head Block from the unit.
- Install the CTL Head Block on the chassis with the two screws so that the two pins of the chassis are inserted into the CTL Head Block holes.

  (Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
  - If the connector is not inserted properly, the "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
  - Install the shield plate and the DR-254 board.



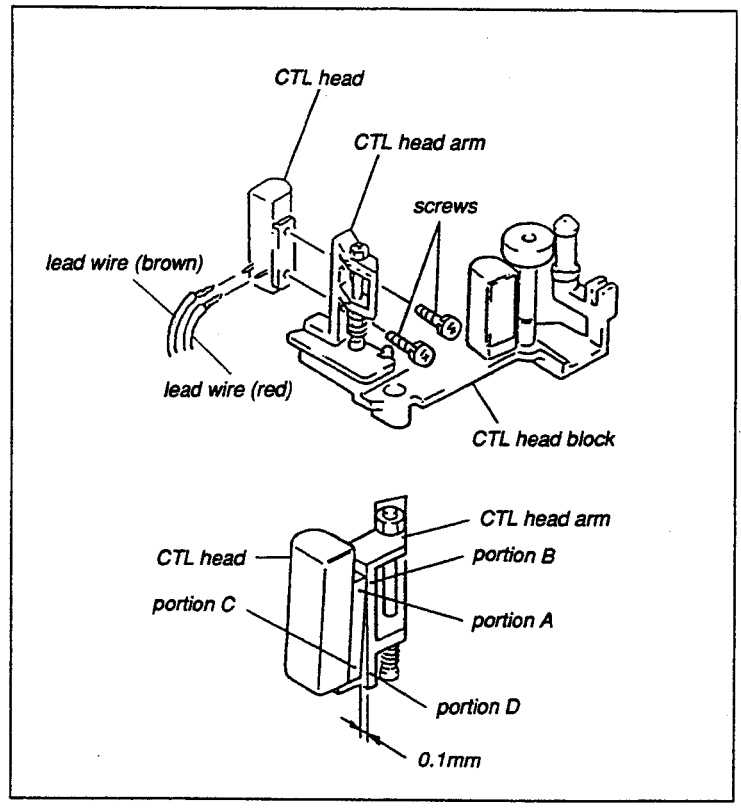


4-23-1. Replacement of the CTL Head

Mode: EJECT

Replacement procedure:

(1) Remove the shield plate and the DR-254 board from the unit. (Refer to Section 4-23.)
(2) Remove the CTL Head Block from the unit.
(3) Unsolder the two lead wires which are mounted onto the CTL Head.
(4) Remove the two screws of the CTL Head Arm and remove the CTL Head.
(5) Install the new CTL Head to the CTL Head Arm with two screws snugly but do not tighten.
(6) Adjust the CTL Head position so that the surface of the CTL Head Bracket's upper end (portion A in the figure) is the same plane as that of the CTL Head Arm's upper end (portion B), and the CTL Head Bracket's lower end (portion C) is shifted by 0.1mm with respect to CTL Head Arm's lower end (portion D) as shown in the figure. Then, tighten the two fixing screws.
(Tightening torque: 0.3±0.05N•m{3±0.5kg•cm})
(7) Solder the two lead wires removed in Step (2).
(8) Install the CTL Head Block on the unit.
(Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
• If the connector is not inserted properly, "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
(9) Install the shield plate and the DR-254 board.
(10) After replacement, perform the adjustments in Section 4-42.

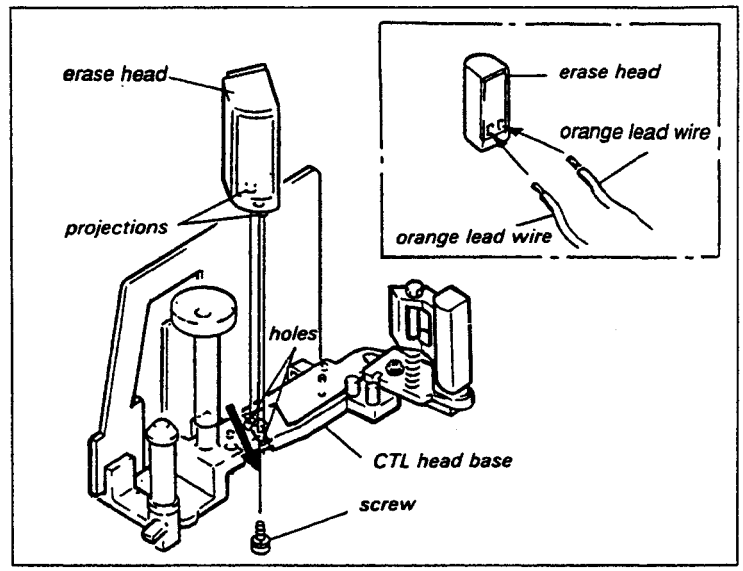


4-23-2. Replacement of the Erase Head

Mode: EJECT

Replacement procedure:

(1) Remove the shield plate and the DR-254 board from the unit. (Refer to 4-23).
(2) Remove the CTL Head Block from the unit.
(3) Remove a screw from the lower side of the CTL Head Block and remove the Erase Head.
(4) Unsolder the two lead wires of the Erase Head.
(5) Solder two lead wires onto the new Erase Head. (When viewed from the back of the head, the two orange lead wires should not cross each other.)
(6) Insert the two projections at the lower portion of the head into the holes of the CTL Head Base, and tighten the fixing screw while pushing it in the direction of the arrow.
(7) Install the CTL Head Block on the unit.
(Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
• If the connector is not inserted properly, "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
(8) Install the shield plate and the DR-254 board.
(9) After replacement, perform the adjustment in Section 4-42.

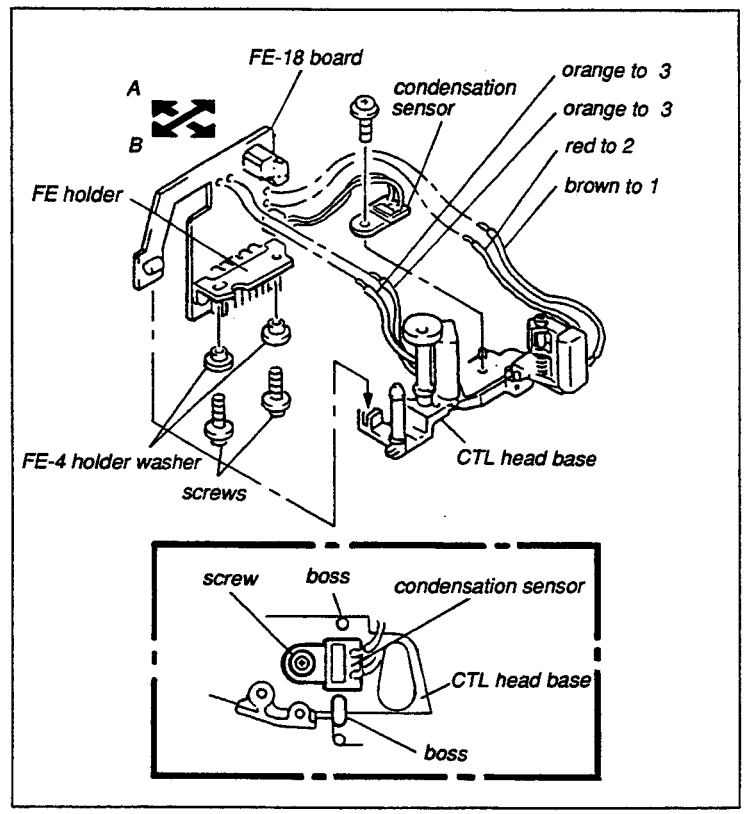


4-23-3. Replacement of the FE-18 Board

Mode: EJECT

Replacement procedure:

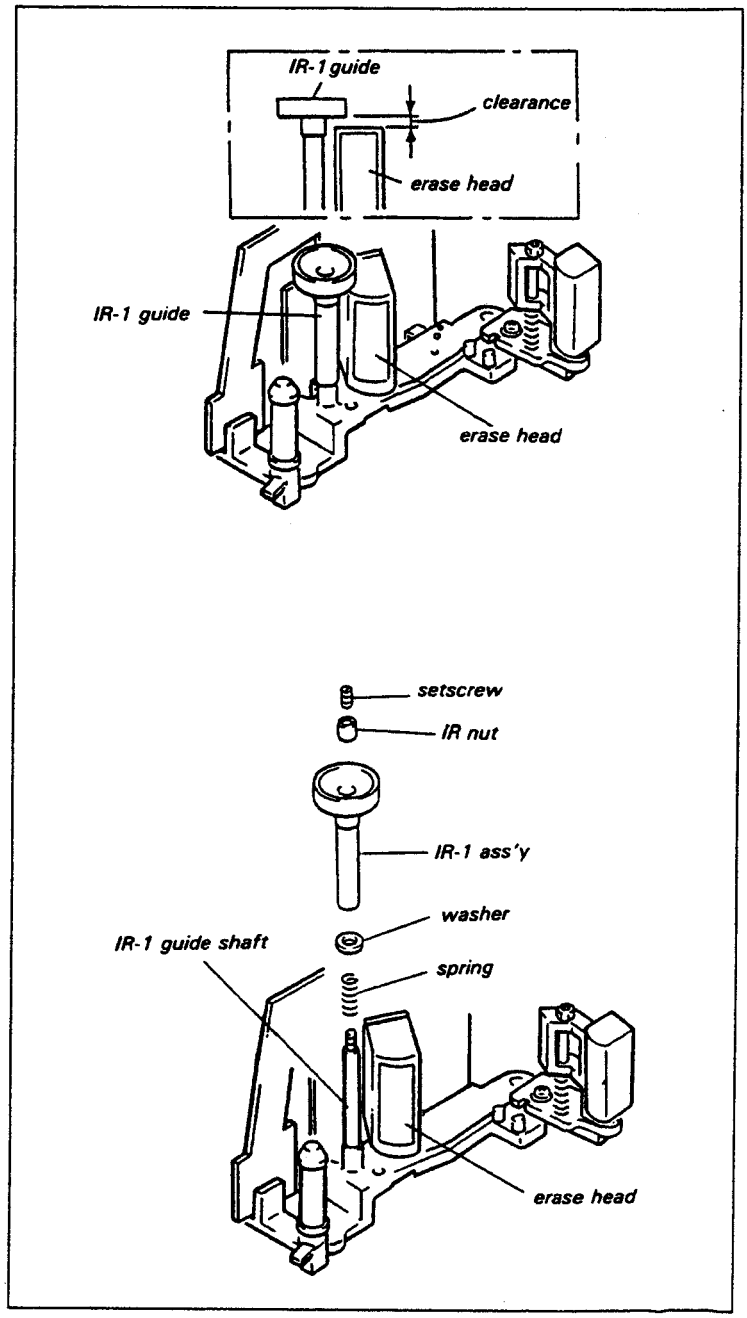
(1) Remove the shield plate and the DR-254 board from the unit. (Refer to Section 4-23.)
(2) Remove the CTL Head Block from the unit.
(3) Remove the condensation sensor which is attached to the CTL Head Base.
(4) Remove the two screws from the lower side of the CTL Head Block and remove the FE-18 Board. The FE-4 Holder Spacerers are inserted between the FE Holder and screw be sure not to lose them.
(5) Unsolder the four lead wires on the FE-18 Board. Unsolder the two lead wires of the condensation sensor which was removed in Step (2).
(6) Solder the lead wire removed in Step (4) onto the new FE-18 Board. (The brown lead wire is soldered to 1, the red to 2, the two orange to 3.3, and the condensation sensors to 8.8)
(7) Install the condensation sensor removed in Step (2) as shown in the figure so that it does not touch the boss of the base.
(8) Pass the FE-4 Holder Spacer through the screw in the direction as shown in the figure and install the FE-4 Board on the CTL Head Base.
(9) Check that the FE-18 Board is slightly shifted in the direction of the arrows A and B.
(10) Install the CTL Head Block on the unit.
(Note) • The connector of the FE-18 Board should be inserted in the connector of the DR-254 Board properly.
• If the connector is not inserted properly, "HUMID" indicator will appear on the display window, the condensation sensor will work, and the unit will stop its operation.
(11) Install the shield plate and the DR-254 board.
(12) After replacement, perform the adjustment in Section 4-42.



4-23-4. Replacement of the IR-1 Guide (Impedance Roller Guide)

Tool: Thickness gauge
Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

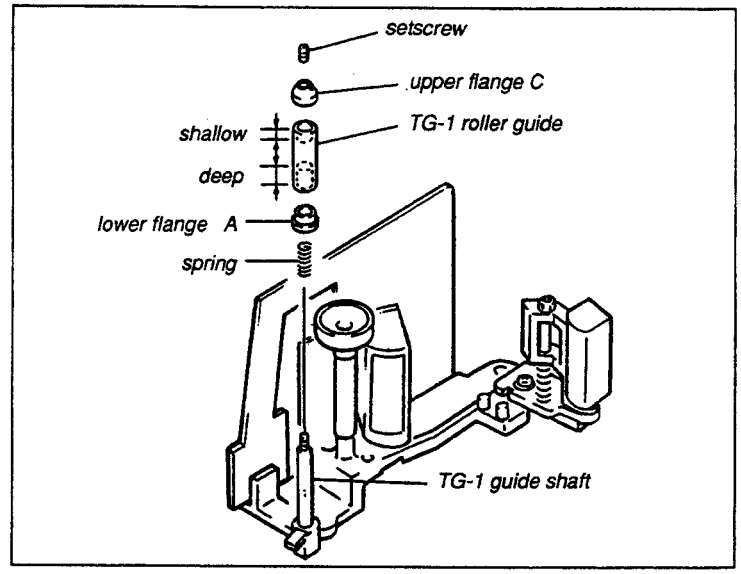
(1) Measure the clearance between the lower surface of the IR-1 Guide's Upper Flange and Erase Head with the thickness gauge. (The clearance should be memorized.)
(2) Loosen the setscrew at the top of the IR-1 Guide with the tape guide adjustment screwdriver.
(3) Remove the IR Nut.
(4) Remove the IR-1 Assembly,washer(1.4mm dia.),and compression spring from the IR-1 Guide Shaft.
(5) Clean the IR-1 Guide Shaft with a cleaning piece moistened with cleaning fluid.
(6) Install the compression spring and washer(1.4mm dia.) remove in Step (4) onto the IR-1 Guide Shaft.
(7) Carefully insert the new IR-1 Assembly onto the IR-1 Guide Shaft.
(8) Install the IR Nut.
(9) Adjust the heigh t of the IR-1 Guide using the IR Nut so that the clearance between the lower surface of the IR-1 Guide's Upper Flange and the Erase Head is the same as the clearance measured in Step (1).
(10) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(11) Recheck the clearance between the lower surface of the IR-1 Guide's Upper Flange and the Erase Head. When the clearance does not meet the required specification, repeat Steps (9) and (10).
(12) After replacement, perform the adjustment in Section 4-42.



4-24. REPLACEMENT OF THE TG-1

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

(1) Loosen the setscrew at the top of the TG-1 with the tape guide adjustment screwdriver.
To ensure that the Upper Flange C does not change the position, turn the setscrew again until its bottom reaches the top of the TG-1 guide shaft. At this time, be careful not to tighten up the setscrew.
(2) Remove the Upper Flange C in the counterclockwise direction.
(3) Remove the TG-1 Roller Guide, Lower Flange A, and the compression spring.
(4) Clean the TG-1 Guide Shaft with a cleaning piece moistened with cleaning fluid.
(5) Insert the compression spring removed in Step (3) onto the TG-1 Guide Shaft.
(6) Carefully insert the Lower Flange A and the TG-1 Roller Guide onto the TG-1 Guide Shaft in the direction as shown in the figure.
(7) Attach the Upper Flange C with the setscrew on to the TG-1 guide shaft.
(8) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(9) After replacement, perform the adjustment in Section 4-42.



4-25. REPLACEMENT OF THE A/T HEAD

- When replacing the A/T Head, be careful not to loosen or tighten the azimuth adjustment screw and zenith adjustment screw shown in the figure.

Tool: Plate parallel
Thickness gauge
Tweezers
Flatness check tool

Mode: EJECT

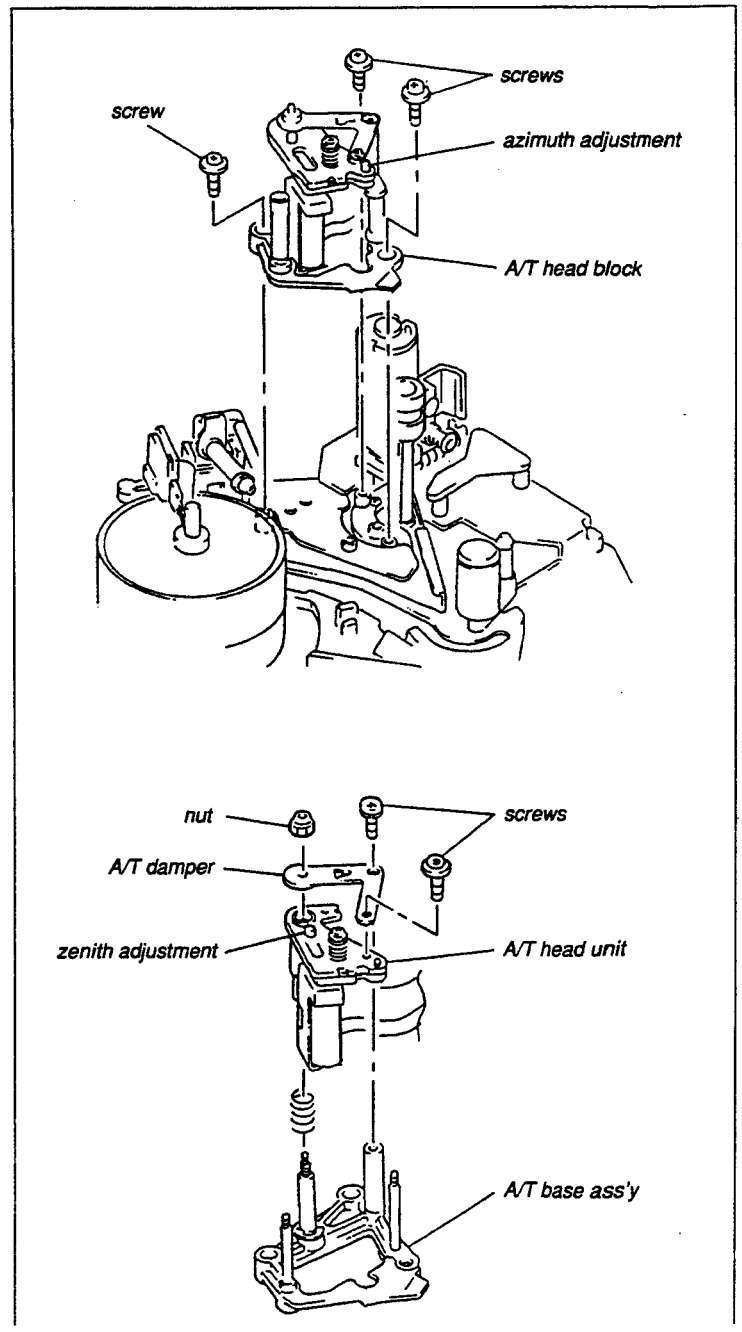
Replacement procedure:

(1) Remove the flexible board (FL-160 Board) of the A/T Head Block which is connected to connector CN2 of the AU-185 Board and connector CN306 of the SS-57 Borad with the tweezers. (Refer to Section 2-11).

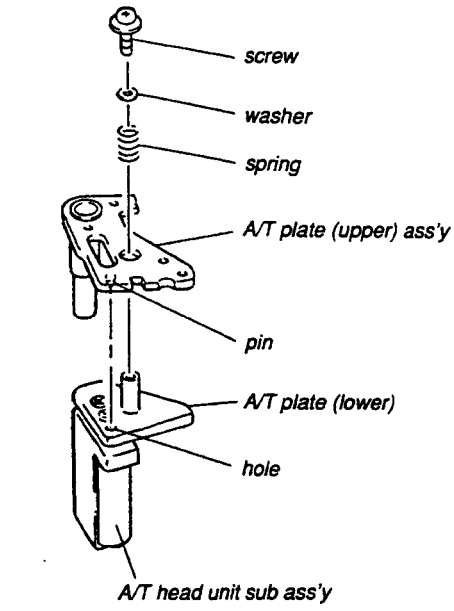
(2) Remove the three fixing c screws of the A/T Head Block and remove the A/T Head Block from the unit. Be careful not to damage the flexible board (FL-160 Board).

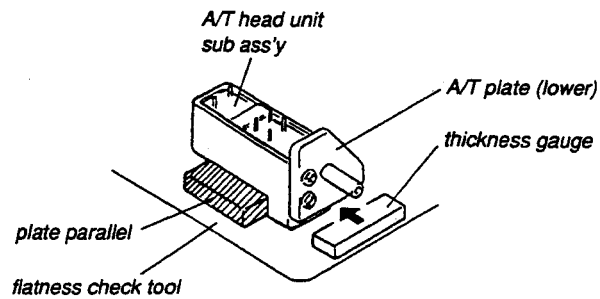
(3) Unsolder the six terminals of the FL-160 Board soldered to the A/T Head and remove the FL-160 Board from the A/T Head Block.

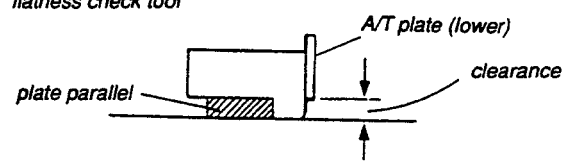
(4) Remove the two screws and one nut shown in the figure, then remove the A/T Head Unit from the A/T Head Block.

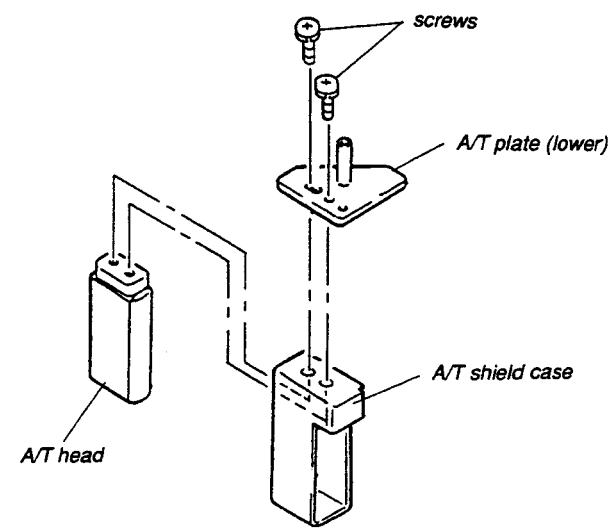


(5) Remove the screw located in the center of the A/T Head Unit and remove the A/T Head Unit Sub Assembly from the A/T Plate (Upper) Assembly.
(6) As shown in the figure, put the flatness plate on the flatness check tool and place the A/T Head Unit Sub Assembly (removed in Step (5)) on it.
(7) Check the clearance between the flatness check tool and the edge of the A/T Plate (Lower) with the thickness guage.
(8) Remove the two screws shown in the figure, remove the A/T Head and A/T Shield Case from the A/T Plate (Lower), and replace the new A/T Head. Thread the two screws on the head snugly but do not tighten.
(9) Put the A/T Head Unit Sub Assembly on the flatness check tool as in Step (6) and insert the thickness gauge checked in Step (7) between the A/T Plate (Lower) and flatness check tool.

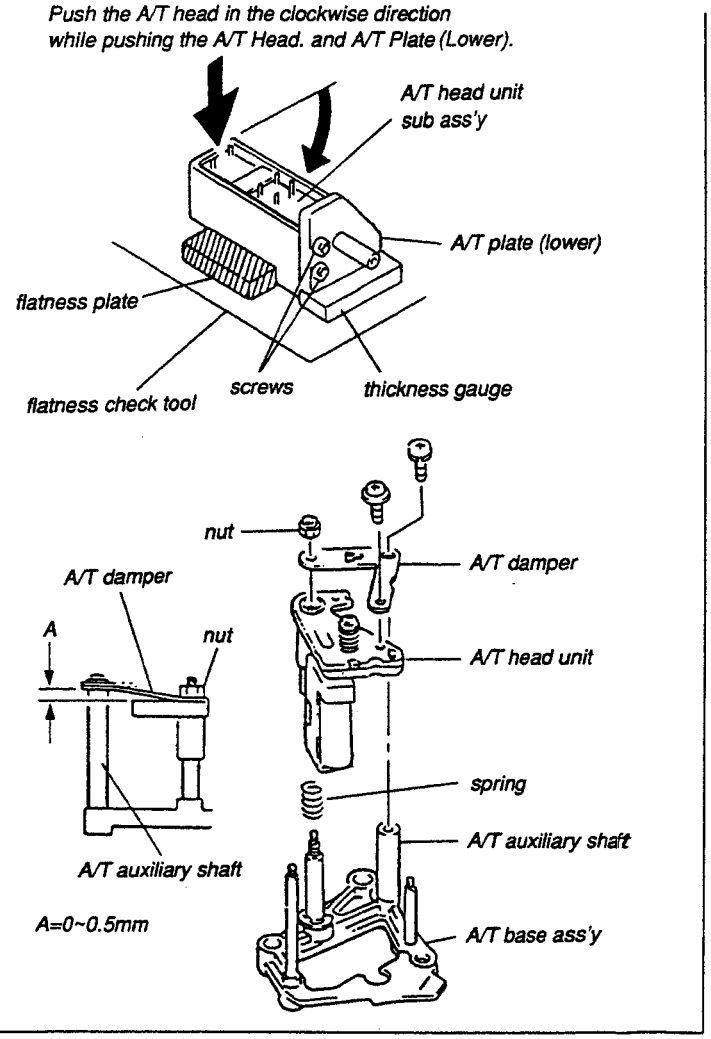








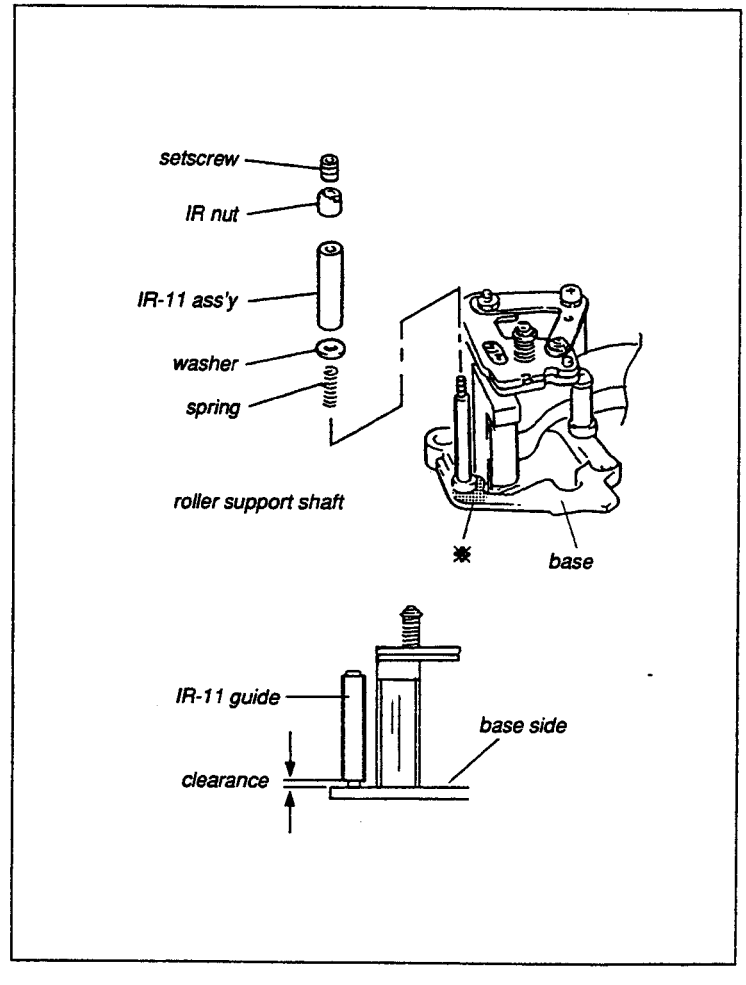
(10) Push the A/T Head and A/T Plate (Lower) towards the flatness check tool, then push only the A/T Head in the clockwise direction further, and tighten the two A/T Head fixing screws.
(11) Install the A/T Head Unit Sub Assembly on the A/T Plate (Upper) Assembly by reversing the Step (5). Check that the pin of the A/T Plate (Upper) Assembly is inserted into the hole of the A/T Plate (Lower).
(12) Install the A/T Head Unit on the A/T Base Assembly. As shown in the figure, adjust the nut so that clearance A (See next page) between the tip of the A/T Auxiliary Shaft and A/T Plate (Upper) Assembly meets the required specification as viewed.
(13) Assemble the A/T Head Block in the unit by reversing the Steps (1) through (3).
(14) After replacement, perform the adjustment in Section 4-42.



4-26. REPLACEMENT OF THE IR-11 GUIDE

Tool: Thickness gauge
Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

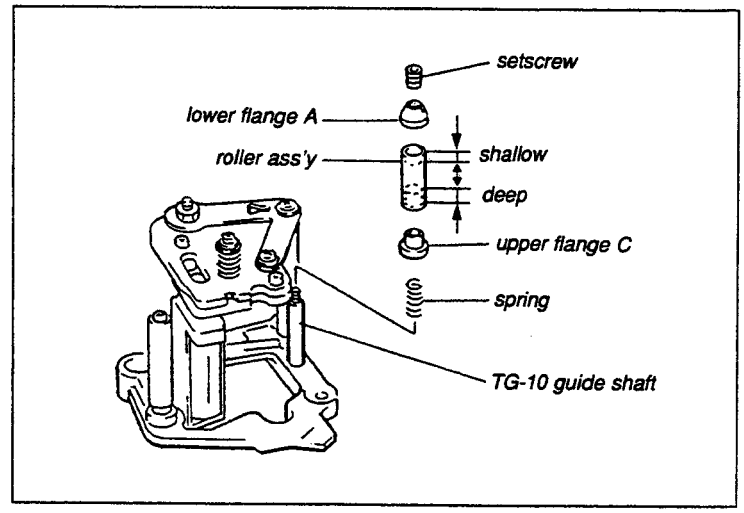
(1) Measure the clearance between the lower surface of an IR-11 guide and the base side with the thickness gauge.
Measure at the * part of the base.
(The clearance should be memorized.)
(2) Loosen the setscrew at the top of the IR-11 Guide with the tape guide adjustment screwdriver.
(3) Remove the IR nut.
(4) Remove an IR-11 guide, washer (1.4mm dia.), and compression spring from the roller support shaft.
(5) Clean the roller support shaft with a cleaning piece moistened with cleaning fluid.
(6) Install the compression spring and washer (1.4mm dia.) removed in Step (4) onto theroller support shaft.
(7) Carefully insert the new IR-11 guide onto the roller support shaft.
(8) Install the IR Nut.
(9) Adjust the height of the IR-11 Guide using the IR Nut so that the clearance between the lower surface of the IR-11 Guide and the base side is the same as the clearance measured in Step (1).
(10) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(11) Recheck the clearance between the lower surface of the IR-11 Guide and the base side. When the clearance dose not meet the required specification, repeat Steps (9) and (10).
(12) After replacement, perform the adjustments in Section 4-42.



4-27. REPLACEMENT OF THE TG-10

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

(1) Loosen the setscrew at the top of the TG-10 with the tape guide adjustment screwdriver.
To ensure that the Upper Flange C does not change the position, turn the setscrew again until its bottom reaches the top of the TG-10 guide shaft.
At this time, be careful not to tighten up the setscrew.
(2) Remove the Upper Flange C.
(3) Remove the Roller Assembly, Lower Flange A, and the compression spring.
(4) Clean the TG-10 Guide Shaft with a cleaning piece moistened with cleaning fluid.
(5) Insert the compression spring removed in Step (3) onto the TG-5 Guide Shaft.
(6) Carefully insert the Lower Flange A and the Roller Assembly onto TG-10 Guide Shaft in the direction shown in the figure.
(7) Attach the Upper Flange C with the setscrew on to the TG-10 guide shaft.
(8) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(9) After replacement, perform the adjustments in Section 4-42.

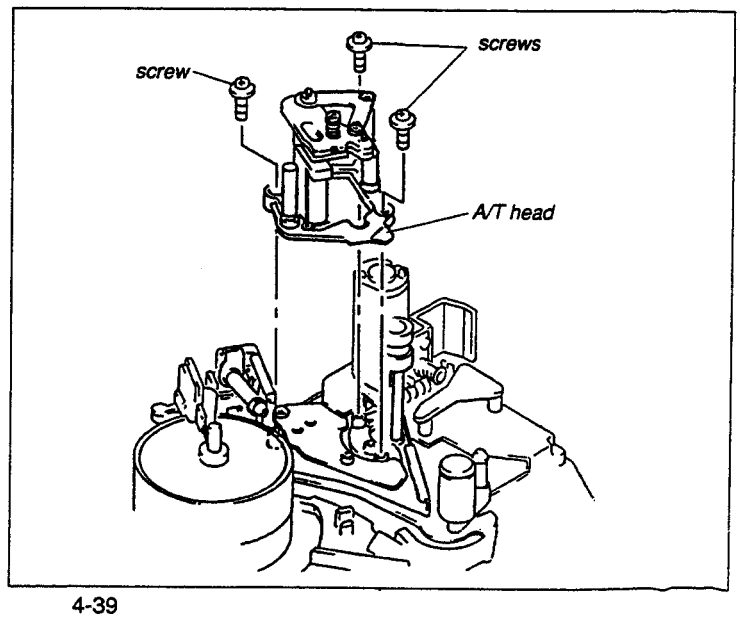


4-28. REPLACEMENT OF THE COMPONENT PARTS OF THE TAKE-UP SIDE SUB BASE

- The T Sub Base Block consists of the TG-8 and the Slant Guide. Replacement of the above componenets is described below.
- When replacing the above components, remove the A/T Head Block from the unit. The removal and installation procedures are described below.

Tool: Tweezers
Mode: EJECT
Removal and Installation Procedures:

- Remove the flexible board (FL-160 Board) of the A/T Head Block which is connected to connector CN2 of the AU-185 Board and connector CN306 of the SS-57 Board with the tweezers. (Refer to Section 2-11.)
- Remove the three fixing screws of the A/T Head Block and remove the A/T Head Block from the unit. Be careful not to damage the flexible board (FL-160 Board) and A/T Head.
- Install by reversing the above.
- When replacing the component of the T-Sub Base, not to remove the frame of the T Sub Base (T Sub Rotation Table) and T Sub Adjustment Plate from the unit.

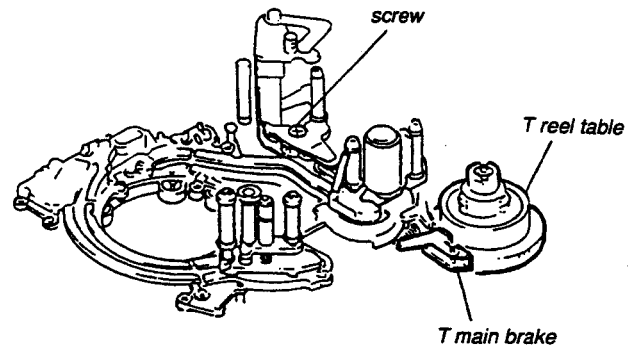


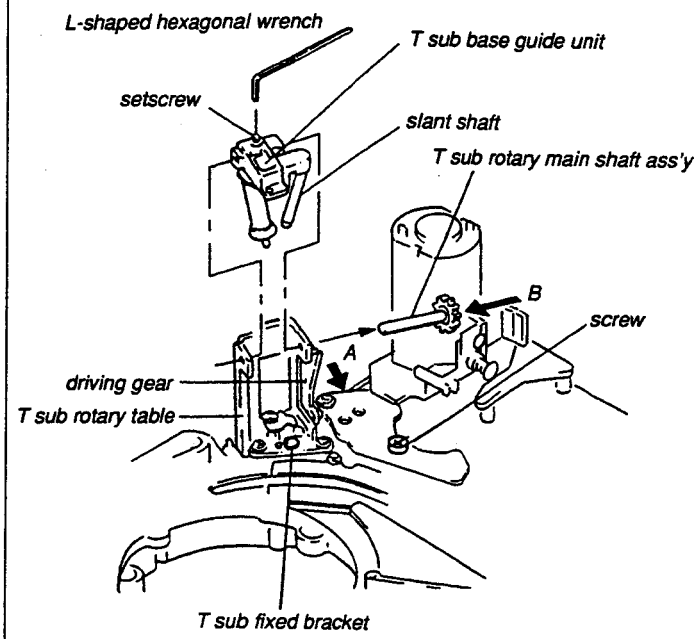
4-28-1. Replacement of the TG-8

• TG-8 is the component part of the T Sub Base Block.

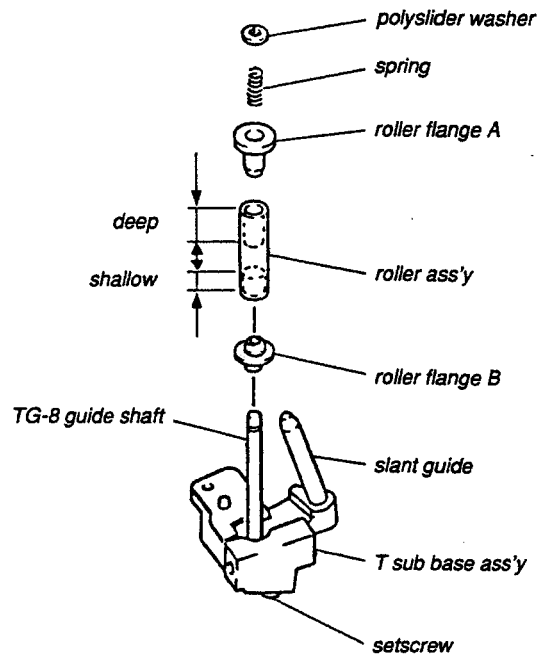
Tool: L-shaped hexagonal wrench (across flat has 0.89mm.)
Tension gauge (50g full scale)
Mode: EJECT → Threading end→ EJECT
Replacement procedure:

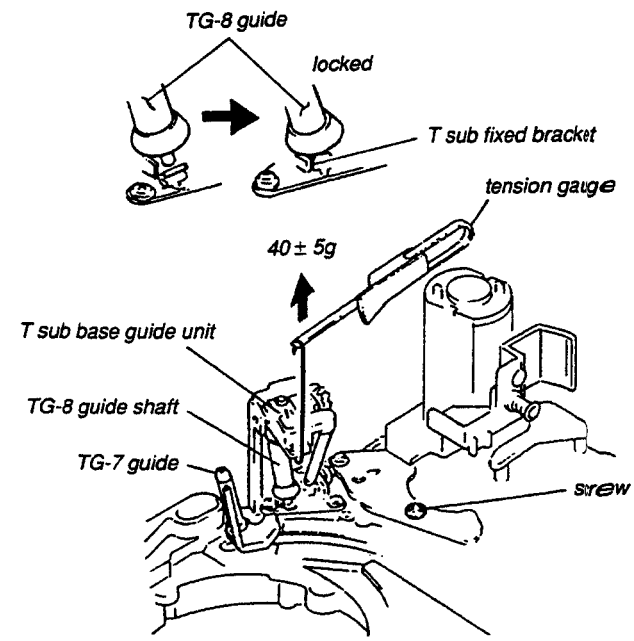
(1) Turn the screw clockwise until each of the tape guides are at position of the threading end as shown in the figure. Keep turning clockwise until the T Main Brake is pressed against the T Reel.
(2) Remove the A/T Head Block from the unit.
(3) Loosen the setscrew at the top of the T Sub Base by turning two or three times with the L-shaped hexagonal wrench.
(4) Pull the T Sub Rotary Main Shaft Assembly to the A/T head side. Then the T Sub Base Guide Unit can be removed.

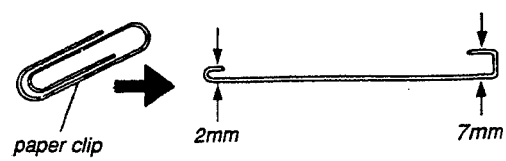




(5) Remove the polyslider washer from the top of the TG-8 Guide.
(6) Remove the compression spring, Roller Flange A, Roller Assembly (TG-8), and Roller Flange B from the TG-8 Guide Shaft.
(7) Clean the TG-8 Guide Shaft with a cleaning piece moistened with cleaning fluid.
(8) Carefully insert the Roller Flange B, Roller Assembly (TG-8), and Roller Flange A onto the TG-8 Guide Shaft in the direction as shown in the figure.
(9) Insert the compression spring onto the TG-8 Guide Shaft, then push the 1.2mm diameter polyslider washer on the shaft.
(10) Install the assembled T Sub Base Guide Unit onto the T Sub Rotary Table with the T Sub Rotary Table with the T Sub Rotary Main Shaft assembly. (Do not tighten the setscrew too much.)
(11) Slowly turn the screws mentioned in Steps (1) counterclockwise until the T Sub Fixed Bracket touches the T Sub Rotary Table. (At that time, do not move the Driving Gear of the T Sub Rotary Table.)
(12) Push the top edge of the TG-8 Guide Shaft onto the T Sub Rotary Table side (the opposite side to the drum).
(13) Turn the screws clockwise until the T Main Brake is pressed against the T Reel Table as described in Step (1).
(14) While pushing the Driving Gear in the direction of the arrow A and T Sub Rotary Main Shaft Assembly in the direction of the arrow B, tighten the setscrew.
(15) Turn the screw described in Step (1) so that the top edge of the TG-8 is locked by the T Sub Fixed Bracket.
(16) Reform the small paper clip as shown in the figure.
(17) Insert the reformed paper clip into the hole of the T Sub Base Guide Unit and hang the tension gauge on the other end.
(18) Move the tension gauge in the upward direction to the unit until it shows 40 ± 5g. (Never applied 50g or more.)
(19) Turn the screw described in Step (1) clockwise, and check that the top edge of the TG-8 Guide is firmly locked by the T Sub Fixed Bracket. When threading or unthreading check that the TG-8 Guide Roller and the TG-7 Guide are not touching. If the specification is not satisfied, perform the Step (14) again. At that time, change the degree of pressure a little when pushing in the direction of arrow A.



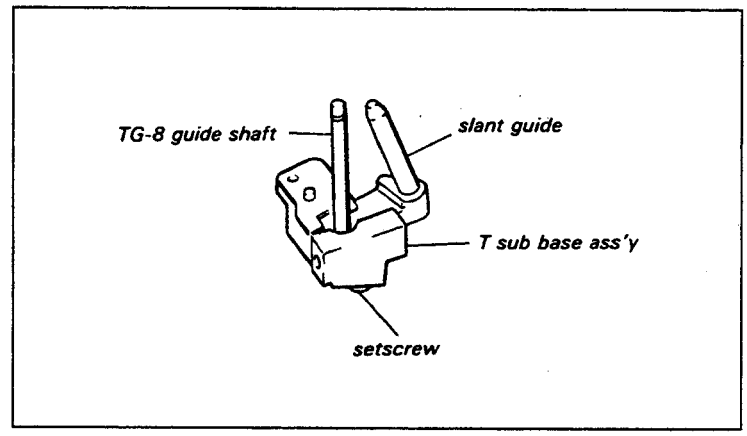




4-28-2. Replacement of the Slant Guide

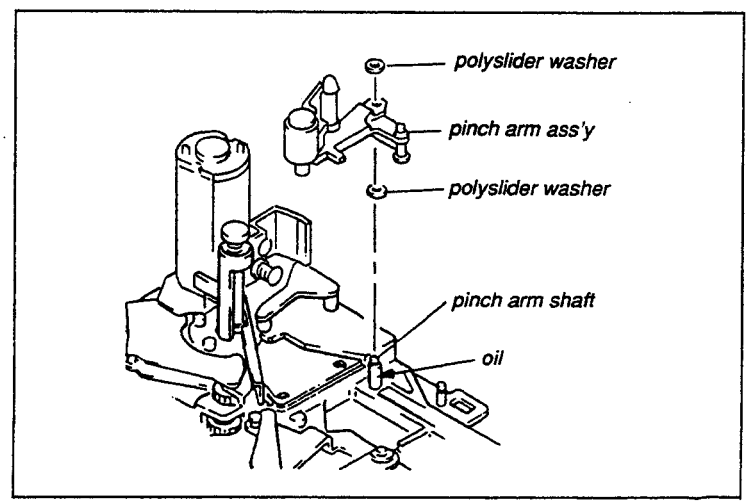
• The Slant Guide is the component part of the T Sub Base Block.

Tool: L-shaped hexagonal wrench (across flat has 0.89mm dia.)
Mode: EJECT → Threading end → EJECT
Replacement procedure:
(1) The same as in Steps (1) through (6) of Section 4-28-1.
(2) Remove the setscrew from the removed T Sub Base Assembly and install it on the new T Sub Base Assembly.
(3) Clean the TG-8 Guide Shaft of the T Sub Base Assembly and Slant Guide with a cleaning piece moistened with cleaning fluid.
(4) Assemble as described in Steps (8) through (19) of Section 4-28-1.
(5) After replacement, perform the adjustments in Section 4-42.



4-29. REPLACEMENT OF THE PINCH ARM ASSEMBLY

Tool: Tweezers
Mode: EJECT
Replacement procedure:
(1) Remove the Pinch Arm Lock Lever from the unit. (Refer to Section 4-19.)
(2) Remove the polyslider washer fixing the Pinch Arm Assembly and remove the assembly from the unit.
(3) Clean the Pinch Arm Shaft with a cleaning piece moistened with cleaning fluid.
(4) Apply an 1/4 drop of Sony oil on the Pinch Arm Shaft.
(5) Install the new Pinch Arm Assembly.
(6) Insert the polyslider washer (1.2mm dia.) onto the shaft and fasten the Pinch Arm Assembly.
(7) Install the Pinch Arm Lock Lever. (Refer to Section 4-19.)
(8) After replacement, perform the adjustment in Section 4-42.

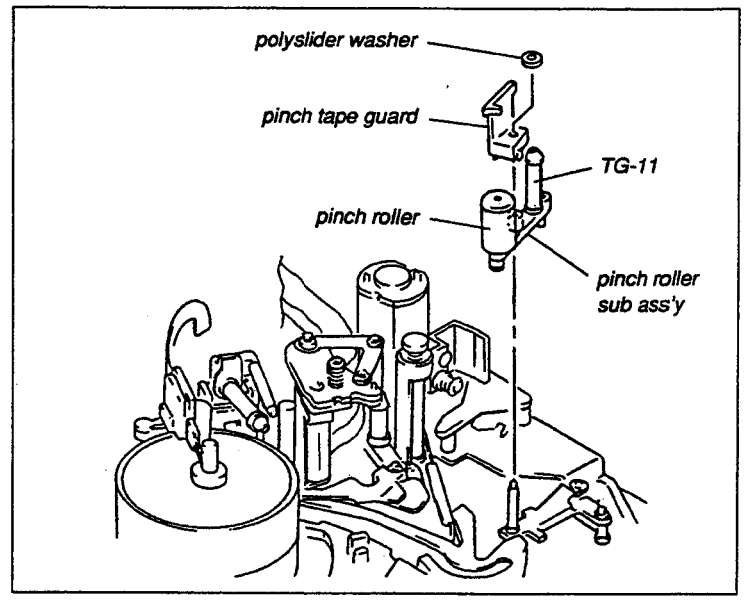


4-30. REPLACEMENT OF THE PINCH ROLLER SUB ASSEMBLY

- The TG-11 Guide is installed on the shaft of the Pinch Roller sub Assembly.
- When replacing the Pinch Roller Sub Assembly, the TG-11 Guide must be replaced at the same time.
  (Refer to Section 4-31.)

Mode: EJECT
Replacement procedure:

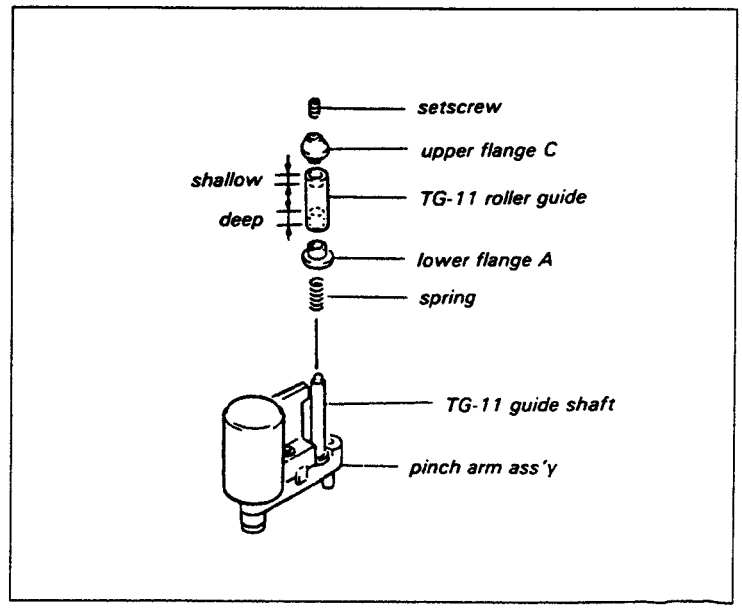
(1) Remove the polyslider washer fixing the Pinch Roller Sub Assembly onto the Pinch Arm Assembly.
(2) Remove the Pinch Tape Guard and the Pinch Roller Sub Assembly from the unit.
(3) Install the TG-11 Guide of the old Pinch Roller Sub Assembly onto the new Pinch Roller Sub Assembly as described in Section 4-31.
(4) After installing the Pinch Roller Sub Assembly and the Pinch Tape Guard on the Pinch Arm Assembly, push a polyslider washer onto the shaft.
(5) Clean the pinch roller with a cleaning piece moistened with cleaning fluid.
(6) After replacing, perform the adjustment in Section 4-42.



4-31. REPLACEMENT OF THE TG-11

Tool: Tape guide adjustment screwdriver
Mode: EJECT
Replacement procedure:

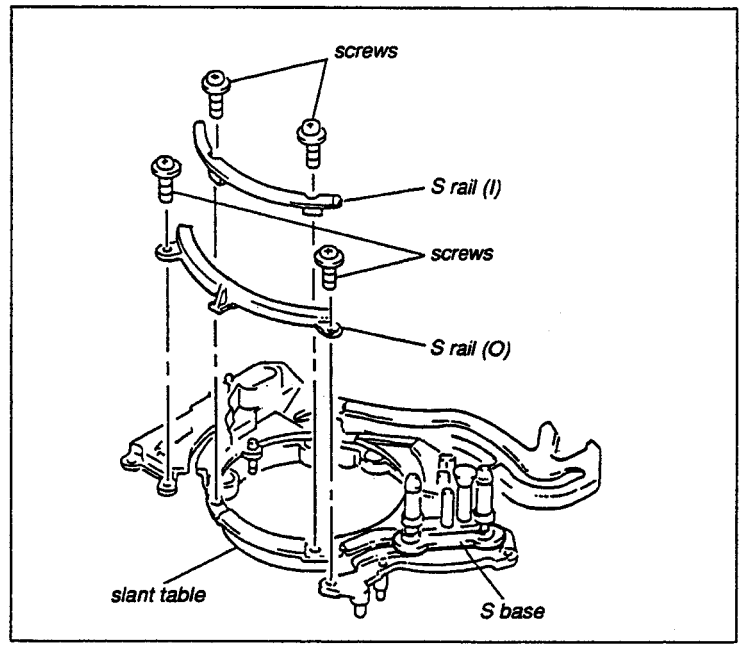
(1) Loosen the setscrew at the top of the TG-10 with the tape guide adjustment screwdriver.
To ensure that the Upper Flange C does not change the position, turn the setscrew again until its bottom reaches the top of the TG-11 guide shaft.
At this time, be careful not to tighten up the setscrew.
(2) Remove the Upper Flange C.
(3) Remove the TG-11 Roller Guide, Lower Flange A, and the compression spring.
(4) Clean the TG-11 Guide Shaft with a cleaning piece moistened with cleaning fluid.
(5) Insert the compression spring removed in Step (3) onto the TG-11 Shaft.
(6) Carefully insert the Lower Flange A and the TG-11 Roller Guide onto the TG-11 Guide Shaft in the direction as shown in the figure.
(7) Attach the Upper Flange C with the setscrew on to the TG-11 guide shaft.
(8) Tighten the setscrew at the top of the guide with the tape guide adjustment screwdriver.
(9) After replacement, perform the adjustment in Section 4-42.



4-32. REPLACEMENT OF THE SUPPLY SIDE RAIL (I)

Mode: EJECT
Replacement procedure:

(1) Remove the Drum Assembly from the unit. (Refer to Section 4-6.)
(2) Remove the two screws on the S Rail (I) and remove it from the unit.
(3) Install the new S Rail (I) on the unit so that the clearance between the new S Rail (I) and S Rail (O) is 3.1 to 3.4mm.
(4) Repeat threading and unthreading two or three times and check that they can be done smoothly.
(5) Install the Drum Assembly on the unit.
(6) After replacement, perform the adjustments in Section 4-42.



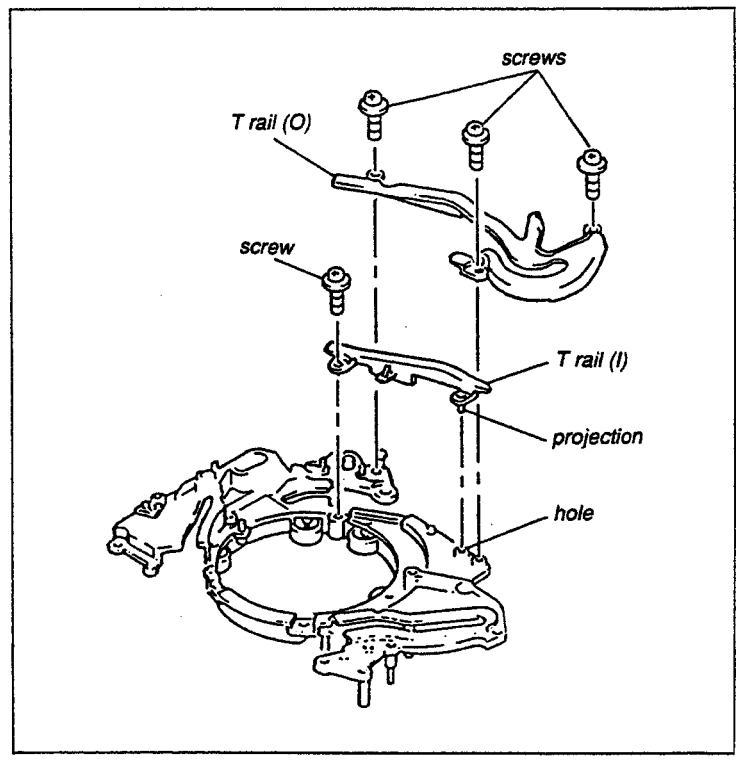
4-33. REPLACEMENT OF THE SUPPLY SIDE RAIL (O)

Mode: EJECT
Replacement procedure:

(1) Remove the two screws of the S Rail (O) and remove it from the unit.
(2) Install a new S rail (O) on the unit so that the clearance between the new S Rail (O) and S Rail (I) is 3.1 to 3.4mm.
(3) Repeat threading and unthreading two or three times and check that they can be done smoothly.

4-34. REPLACEMENT OF THE TAKE-UP SIDE RAIL (I)

Mode: Threading end
Replacement procedure:
(1) Remove the Drum Assembly from the unit. (Refer to Section 4-6.)
(2) Remove a fixing screw on the T Rail (I) and remove it from the unit.
(3) Install the new T Rail (I) so that its projection is inserted into the chassis hole and the clearance between the new T Rail (I) and T Rail (O) is 3.1mm to 3.5mm.
(4) Repeat threading and unthreading two or three times and check that they can be done smoothly.
(5) Install the Drum Assembly on the unit.
(6) After replacement, perform the adjustments in Section 4-42.



4-35. REPLACEMENT OF THE TAKE-UP SIDE RAIL(O)

Mode: Threading end
Replacement procedure:
(1) Remove the three fixing screws of the T Rail (O) and remove it.
(2) Install the new T Rail (O) on the unit so that the clearance between the new T Rail (O) and T Rail (I) is 3.1 to 3.5mm.
(3) Repeat threading and unthreading two or three times and check that they can be done smoothly.

4-36. REPLACEMENT OF THE LOADING MOTOR

- When replacing the Loading Motor, replacement of the Loading Motor Assembly is recommended.

Mode: EJECT

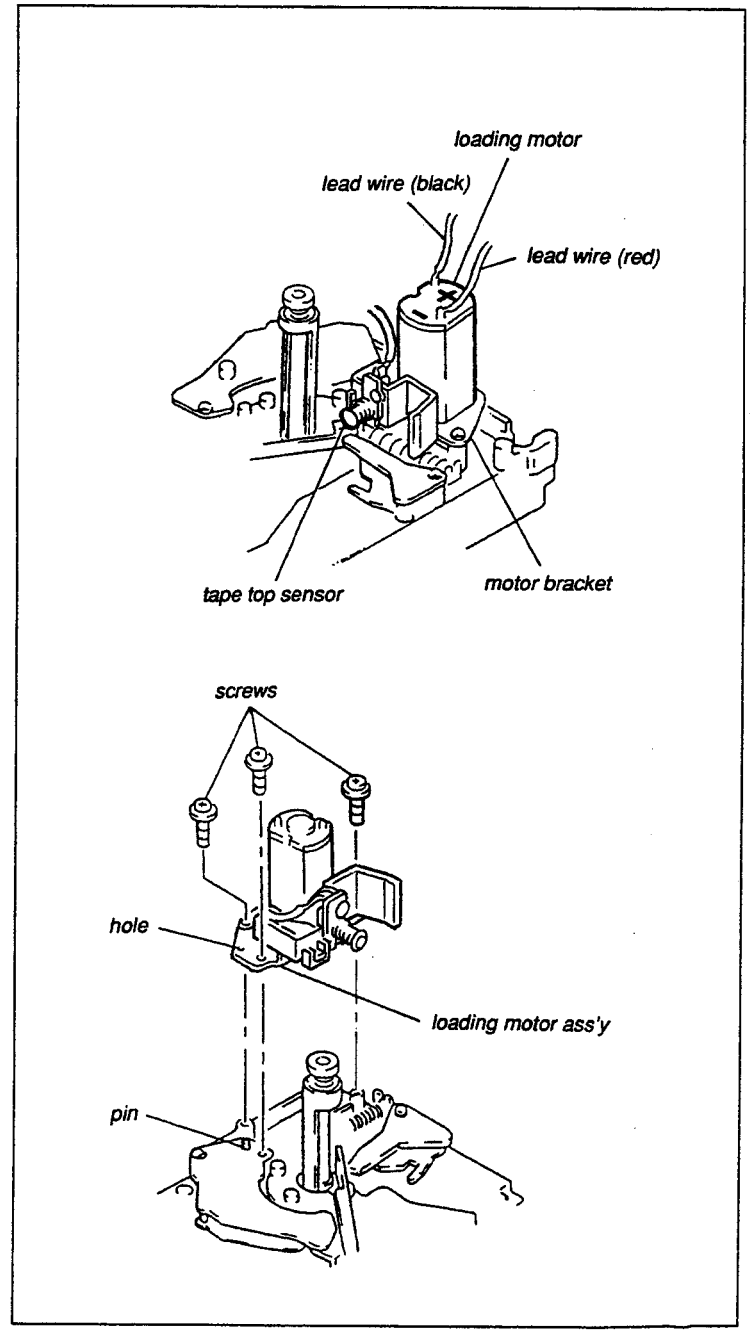
Replacement procedure:

(1) Remove the connector for the leading motor attached to the CN305 on the SS-S7 board, and the connector for the tape-top sensor attached to the CN308.

(2) Remove the three screws shown in the figure, then remove the Loading Motor Assembly from the unit.

(3) After inserting the chassis pin into the hole of the new Loading Motor Assembly, install the Loading Motor Assembly, install the Loading Motor Assembly with the three fixing screws.

(4) Assemble by reversing the Steps (1), (2) and (3).

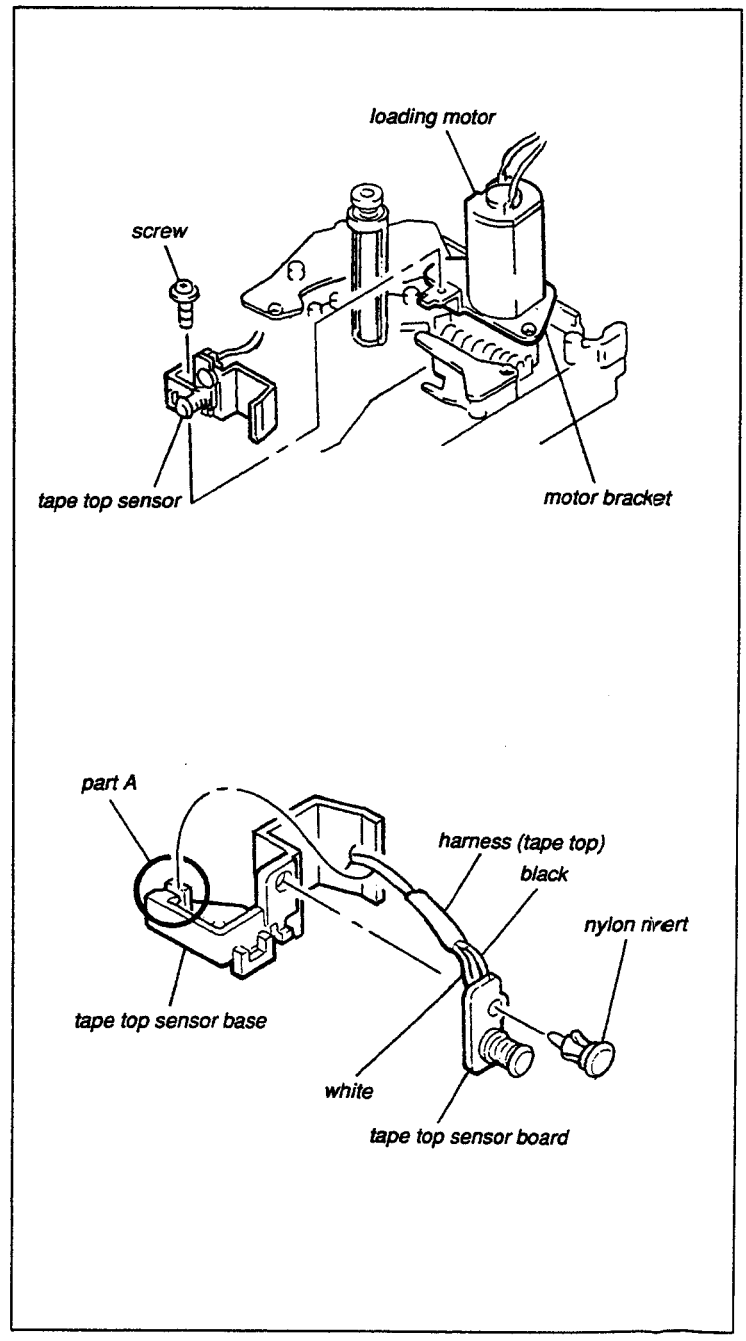


4-36-1. Replacement of Tape Top Sensor

The tape top sensor is a part of the loading motor assembly.

Mode: EJECT
Replacement procedure:

(1) Remove the screw shown in the figure and remove the tape top sensor from the motor bracket.
(2) Disconnect the connector of the harness (tape top) from CN308 of the SS-57 Board.
(3) Remove the nylon rivet shown in the figure and remove the tape top sensor board from the tape top sensor base.
(4) Pass the new harness (tape top) through part A of the tape top sensor base and attach it in the reverse order of steps (1), (2), and (3).

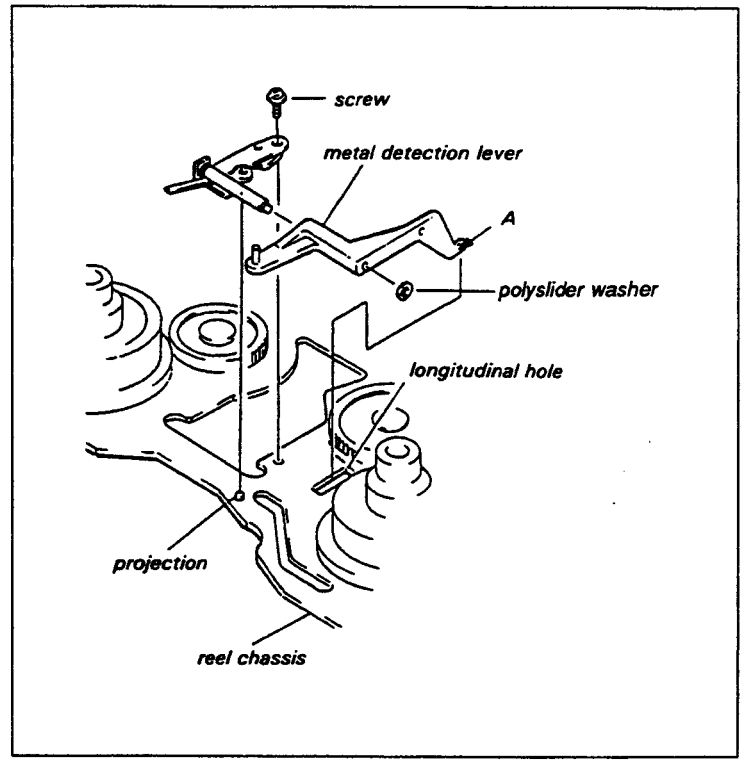


4-37. REPLACEMENT OF THE METAL DETECTION LEVER

Mode: EJECT

Replacement procedure:

(1) Remove the Brake Slider referring to Section 4-17.
(2) Remove a screw of the Metal Detection Lever and remove it from the unit.
(3) Remove the polyslider washer of the Metal Detection Lever and replace it with a new one.
(4) Install the Metal Detection Lever with the 1.2mm diameter polyslider washer.
(5) Install the Metal Detection Lever on the chassis and fix it with the fixing screw so that portion A of the Metal Detection Lever is inserted into the logitudinal hole and the projection of the reel chassis is inserted into the hole of the Metal Detection Lever.
(6) Install the Brake Slider referring to Section 4-17.

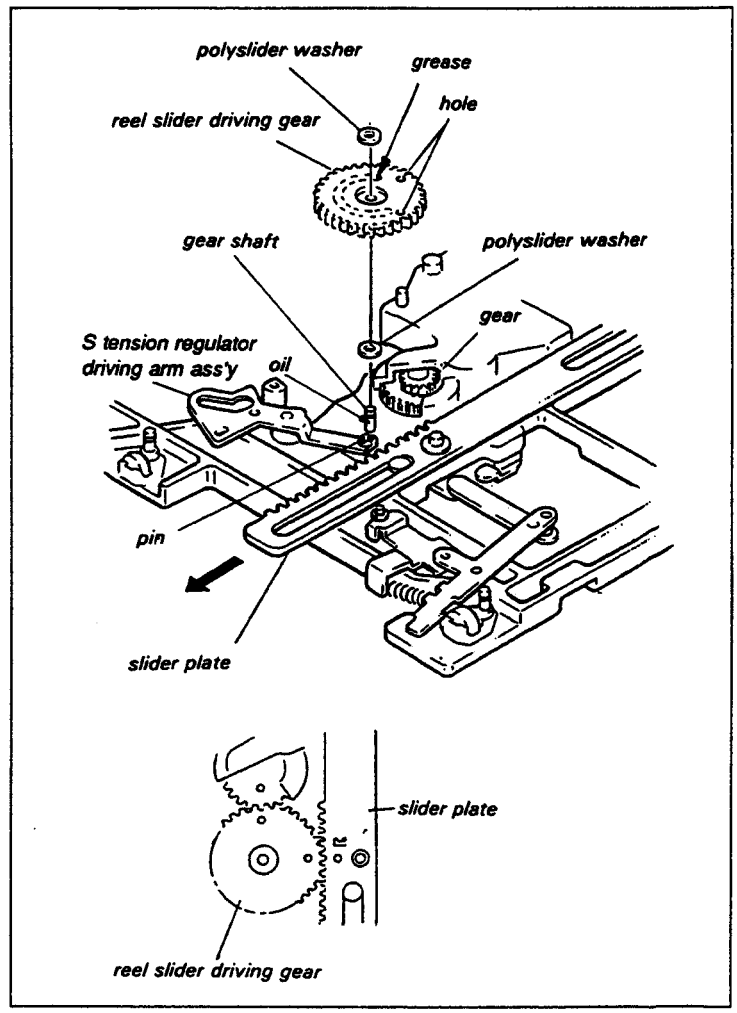


4-38. REPLACEMENT OF THE REEL SLIDER DRIVING GEAR

- When replacing this part, remove the Reel Chassis from the Mechanical Deck Block. (Refer to Section 2-10.)

Tool: Sony grease
Sony oil
Mode: EJECT
Replacement procedure:

(1) Remove the Reel Chassis. (Refer to Section 2-10.)
(2) Remove the polyslider washer fixing the Reel Slider Driving Gear, then remove the Reel Slider Driving Gear and the polyslider washer (1.6mm dia.).
(3) Clean the Gear Shaft with a cleaning piece moistened with cleaning fluid.
(4) Install the polyslider washer (1.6mm dia.) on the shaft.
(5) Apply an 1/4 drop of Sony oil on the shaft.
(6) Smear a little Sony grease onto the groove of the new Reel Slider Driving Gear.
(7) Move the Slider manually in the direction of the arrow until it stops.
(8) Insert the Reel Slider Driving Gear into the shaft so that the pin of the S Tension Regulator Driving Arm Assembly is into the groove of the Driving Gear, and so that the positional relationship between the holes on the other gear and the slider plate and two holes of the Driving Gear as shown in the figure.
(9) Push the polyslider washer (1.2mm dia.) onto the shaft and fasten the Reel Slider Driving Gear.
(10) Install the Reel Chassis. (Refer to Section 2-10.)

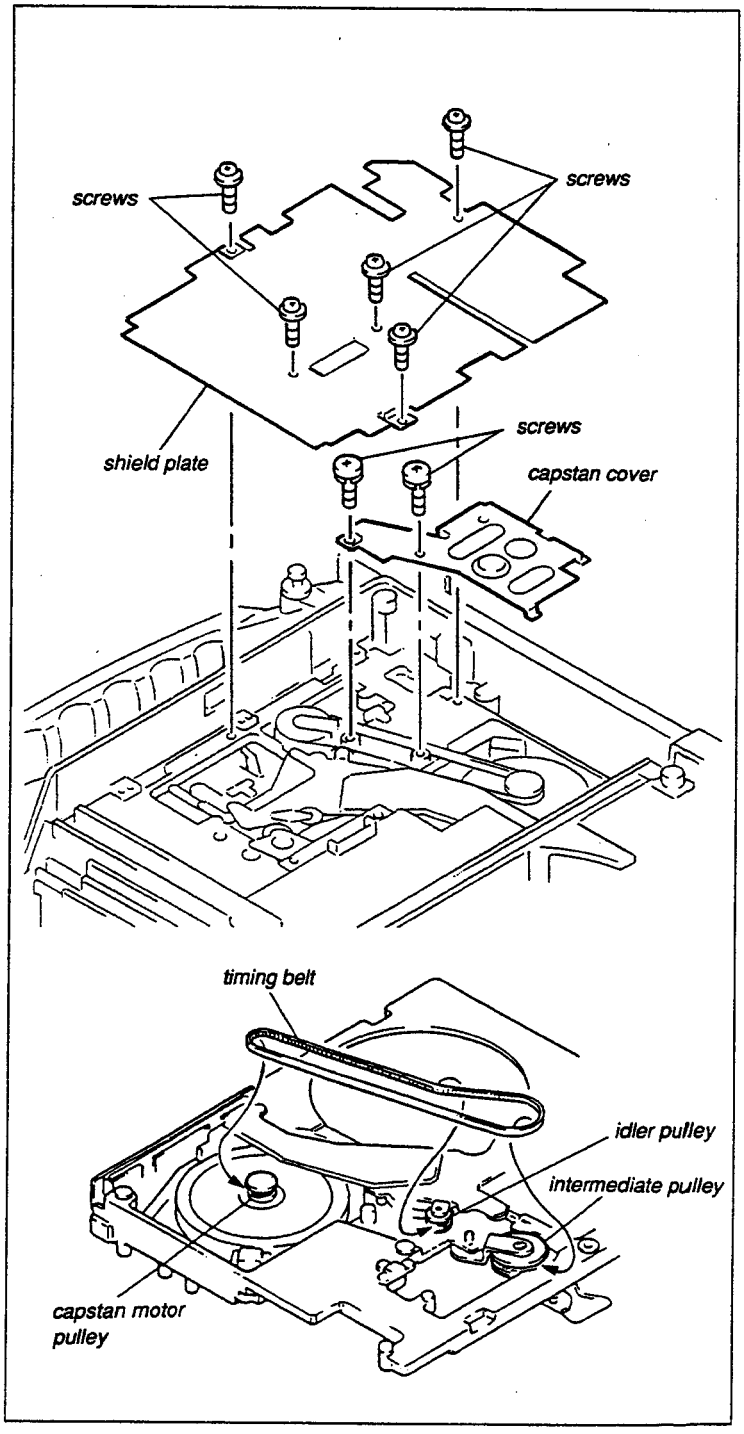


4-39. REPLACEMENT OF THE TIMING BELT

Mode: EJECT

Replacement procedure:

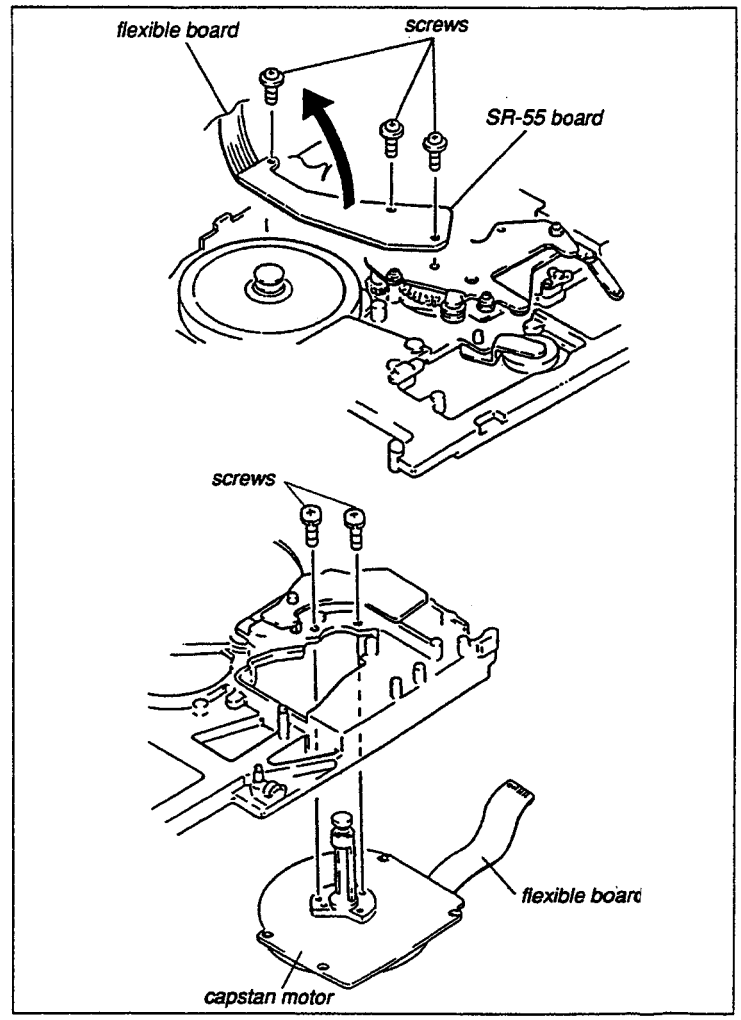
(1) Remove the SS-57 Board. (Refer to Section 2-9-7.)
(2) Remove the five screws attaching the shield plate and remove the shield plate.
(3) Remove the two screws attaching the capstan cover and remove the capstan cover.
(4) Remove the Timing Belt.
(5) Place the new Timimg Belt on the Capstan Motor Pulley, the Intermediate Pulley, then on the Idler Pulley in that order.
(6) Attach in the reverse order of steps (1), (2), and (3).
(7) Adjust the tension of the timing belt. (Refer to Section 5-1.)



4-40. REPLACEMENT OF THE CAPSTAN MOTOR

Mode: EJECT
Replacement procedure:

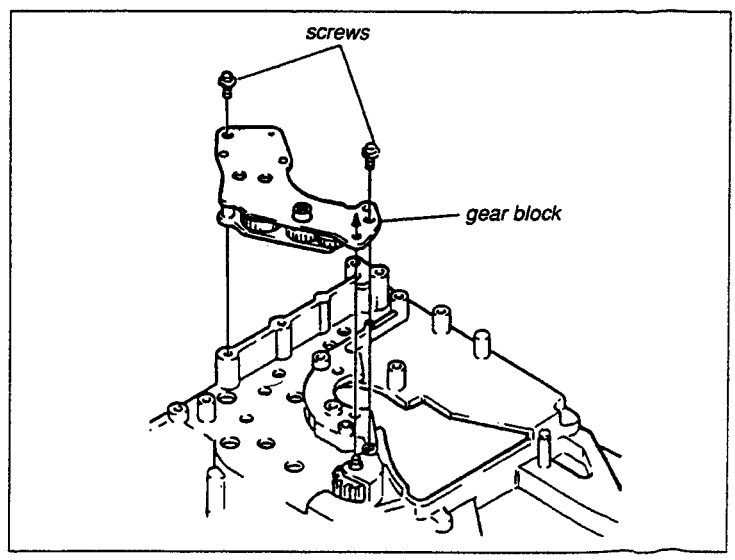
(1) Remove the SS-57 Board. (Refer to Section 2-9-7.)
(2) Remove the shield plate and capstan cover. (Refer to Section 4-39.)
(3) Remove the DR-254 Board. (Refer to Section 2-9-3.)
(4) Remove the three screws attaching the SR-55 Board and open the SR-55 Board toward the flexible board side.
(5) Remove the two fixing screws on the Capstan Motor, then remove the Capstan Motor from the unit.
(6) Install the new Capstan Motor on the Mechanical Deck Block by reversing the Steps (1) through (5).
(Note) It is recommended for easy installing that the tip of the flexible board makes flat.
(7) Adjust the tension of the timing belt. (Refer to Section 5-1.)
(8) Perform the compression lever position check. (Refer to Section 5-2.)
(9) Perform the pinch compression lever position adjustment. (Refer to Section 5-3.)
(10) Perform the tape threading/unthreading check. (Refer to Section 6-3.)
(11) Perform the tape path check (near the pinch roller). (Refer to Section 6-5.)
(12) Perform the tape path adjustment (PLAY mode). (Refer to Section 6-1.)
(13) Perform the tape path check (FF, REW mode). (Refer to Section 6-2.)



4-41. REPLACEMENT OF THE GEAR BLOCK

Mode: EJECT
Replacement procedure:

(1) Remove the Loading Motor as described in Section 4-36, and remove the A/T Head Block as in Section 4-25.
(2) Remove the two fixing screws as shown in the figure, remove the Gear Block, and replace with a new one.
(3) Install the A/T Head Block and the Loading Motor Block as described in Sections 4-25 and 4-36.



4-42. ITEMS TO BE ADJUSTED AFTER THE MAIN PARTS REPLACEMENT

(NUMBERS IN PARENTHESIS REFER TO SECTION NOS.)

Replacement of the Upper Drum Assembly

Brush Position Adjustment (6-16) → Tracking Adjustment (6-8) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF,REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15) → Video System Adjustment (9-5)

Replacement of the Drum Assembly

Tracking Adjustment (6-8) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15) → Servo check (9-3) → Video System Adjustment (9-5)

Replacement of the S Reel Table

Tension Regulator Operating Position Adjustment (5-7) → PLAY Back Tension Adjustment (check)(6-4)

Replacement of the Tension Regulator Band

Tension Regulator Operating Position Adjustment (5-7) → PLAY Back Tension Adjustment (6-4)

Replacement of the Tension Regulator

Tension regulator Operation Position Adjustment (5-7) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → PLAY Back Tension Adjustment (6-4) → Tracking Adjustment (check)(6-8)

Replacement of the TG-7

Threading Position Check (Take-up side)(5-5) → Tape Threading/Unthreading Check (6-3) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → Tracking Adjustment (check)(6-8)

Replacemet of the Component Parts of the T Base

Threading Position Check (Take-up side)(5-5) → Tape Threading/Unthreading Check (6-3) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2) → Tracking Adjustment (6-8) → Tape Path adjustment (PLAY mode)(check)(6-1) → Tape Path check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9) → CTL Head Position Adjustment (check)(6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

Replacement of the TG-4

Threading Position Check (Supply side)(5-4) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode) (check)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9)

Replacement of the TG-5
Threading Position Check (Supply side)(5-4) → Tape Threading/Unthreading check (6-3) → Tracking Adjustment (6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9)

Replacement of the IR-2
Threading Position Check (Supply side)(5-4) → Impedance Roller Guide II Clearance Adjustment (5-6) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9)

Replacement of the S Sub base
Threading Position Check (Supply side)(5-4) → Impedance Roller Guide II Clearance Adjustment (5-6) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (check)(6-9) → CTL Head Position Adjustment (check)(6-10) → TC Head Position Adjustment (check)(6-12)

Replacement of the Component Parts of the S Base
Threading Position Check (Supply side)(5-4) → Impedance Roller Guide 2 Clearance Adjustment (check)(5-6) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

Replacement of the CTL Head
Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12)

Replacement of the Erase Head and the FE-18 Board
Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12)

Replacement of the IR-1 Guide (Impedance Roller Guide), TG-1 Guide, IR-11 Guide, and the TG-10 Guide
Tape Path Adjustment (PLAY mode)(check)(6-1) → Tape Path Check (FF, REW mode) (6-2)

Replacement of the A/T Head
Audio Head Zenith Adjustment (6-11) → Tape Threading/Unthreading check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check) (6-1) → Tape Path Check (FF, REW mode)(6-2) → Audio Head Height Adjustment (6-13) → Audio Head Phase Adjustment (6-14) → Audio System Adjustment (9-4)

Replacement of the TG-8 Guide and the Slant Guide
Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path adjustment (PLAY mode)(check)(6-1) → Tape Path Check (FF, REW mode) (6-2) → Audio Head Height Adjustment (6-13) → Audio Head Phase Adjustment (6-14)

Replacement of the Pinch Arm Assembly and the Pinch Roller Sub assembly
Pinch Press Lever Position Adjustment (5-3) → Tape Threading/Unthreading Check (6-3) → Tape Path Check (Around the Pinch Roller)(6-5) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2)

Replacement of the TG-11
Tape Threading/Unthreading Check (6-3) → Tape Path Check (Around the Pinch Roller)(6-5) → Tape Path Adjustment (PLAY mode)(6-1) → Tape Path Check (FF, REW mode)(6-2)

Replacement of the S Rail (I)
Threading Position Check (Supply side)(5-4) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode) (check)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

Replacement of the T Rail (I)
Threading Position Check (Take-up side)(5-5) → Tape Threading/Unthreading Check (6-3) → Tracking Adjustment (check)(6-8) → Tape Path Adjustment (PLAY mode)(check)(6-1) → Tape Path Check (FF, REW mode)(6-2) → CTL Head Height Adjustment (6-9) → CTL Head Position Adjustment (6-10) → TC Head Position Adjustment (6-12) → Audio Head Height Adjustment (6-13) → TC Head Position Adjustment (check)(6-12) → Audio Head Phase Adjustment (6-14) → PB Switching Position Adjustment (6-15)

SECTION 5
LINK SYSTEM ALIGNMENT

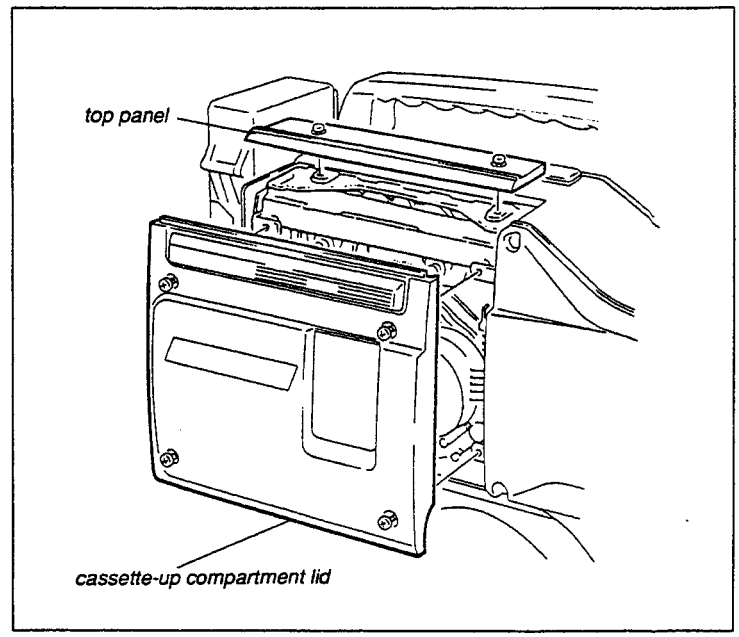
(Preparations)

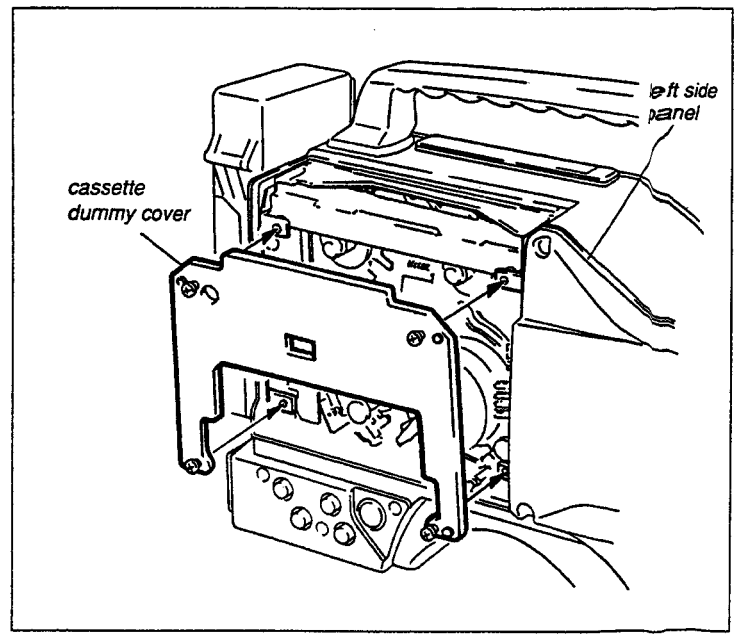
1. VTR's Mechanical Deck Block Adjustment

Adjust the VTR's mechanical deck block as follows.

(1) Put the VTR into the threading end mode.
(2) Remove the Top Panel.
(3) Remove the Cassette-up Compartment Lid and install the Cassette Dummy Cover which is prepared for service.
(4) Remove the Left Side Panel.

Precaution:
Be careful not to damage the flexible card since the lid is connected with the main unit by the flexible card.



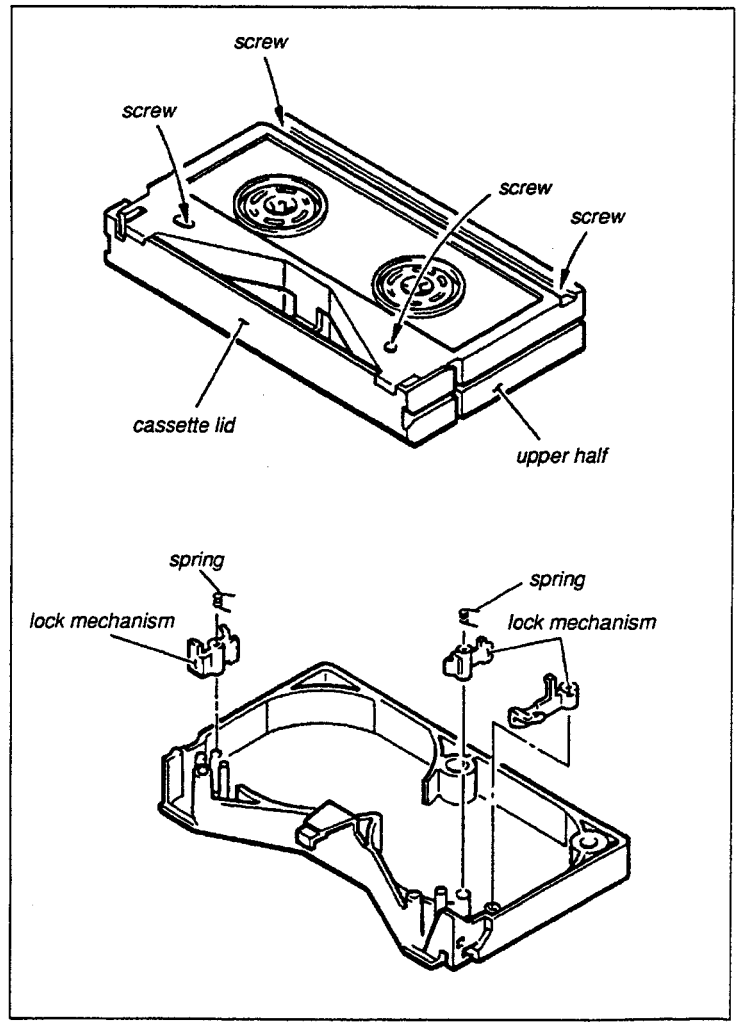


2. Creating the Blank Cassette/Cassette Tape without Lid/Alignment Tape without Lid

Since the VTR is designed to compact size, some mechanical checks and adjustments cannot be performed when a cassette tape lid or cassette tape is installed. Remove the cassette tape lid or cassette tape as follows:

- **Creating the blank cassette**

(1) Remove the four fixing screws on the back of a cassette tape and remove the upper half of the cassette tape as shown in the figure.
(2) Remove the lock mechanism parts and the springs on the left and right.
(3) Remove the cassette lid from the upper half.
(4) Remove the cassette tape.
(5) Install the upper half on the lower half with the four fixing screws from the back side.

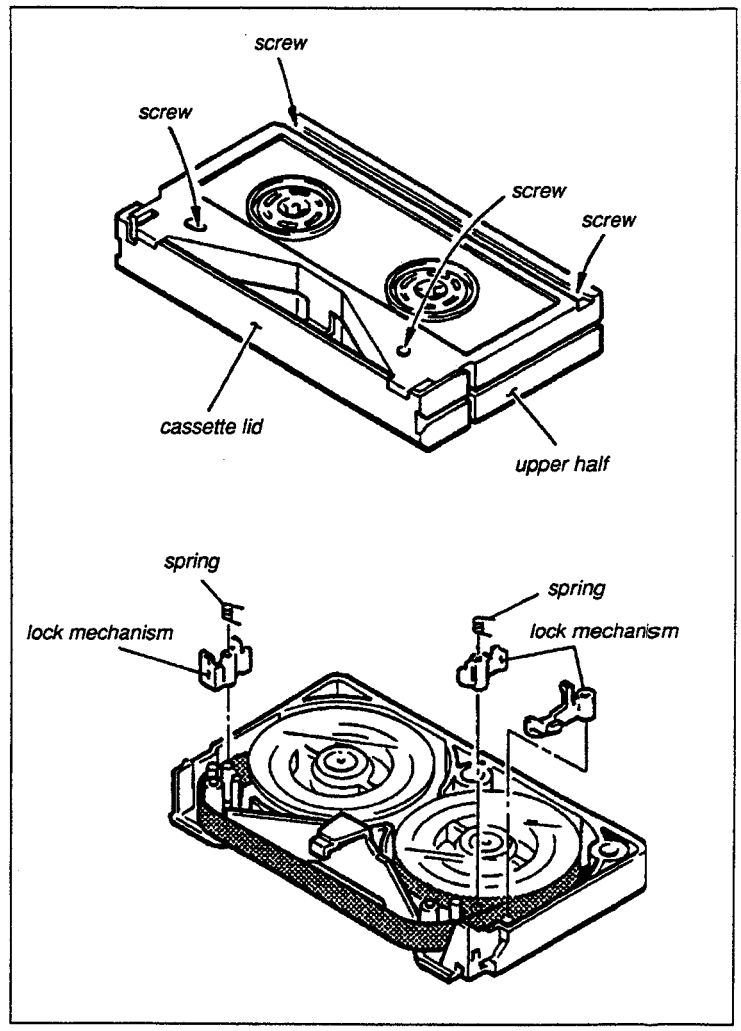


• **Creating the Cassette Tape without Lid**

(1) Remove the four fixing screws on the back of a cassette tape and remove the upper half of the cassette tape as shown in the figure.
(2) Remove the lock mechanism parts and the springs on the left and right.
(3) Remove the cassette lid from the upper half.
(4) Install the upper half on the lower half with the four fixing screws from the back side.

• **Creating the Alignment Tape without Lid**

(1) Remove the four fixing screws on the back of a cassette tape and remove the upper half of the alignment tape as shown in the figure.
(2) Remove the lock mechanism lock parts and the springs on the left and right.
(3) Remove the cassette lid from the upper half.
(4) Install the upper half on the lower half with the four fixing screws from the back side.



5-1. GEAR ASSEMBLY POSITION ADJUSTMENT

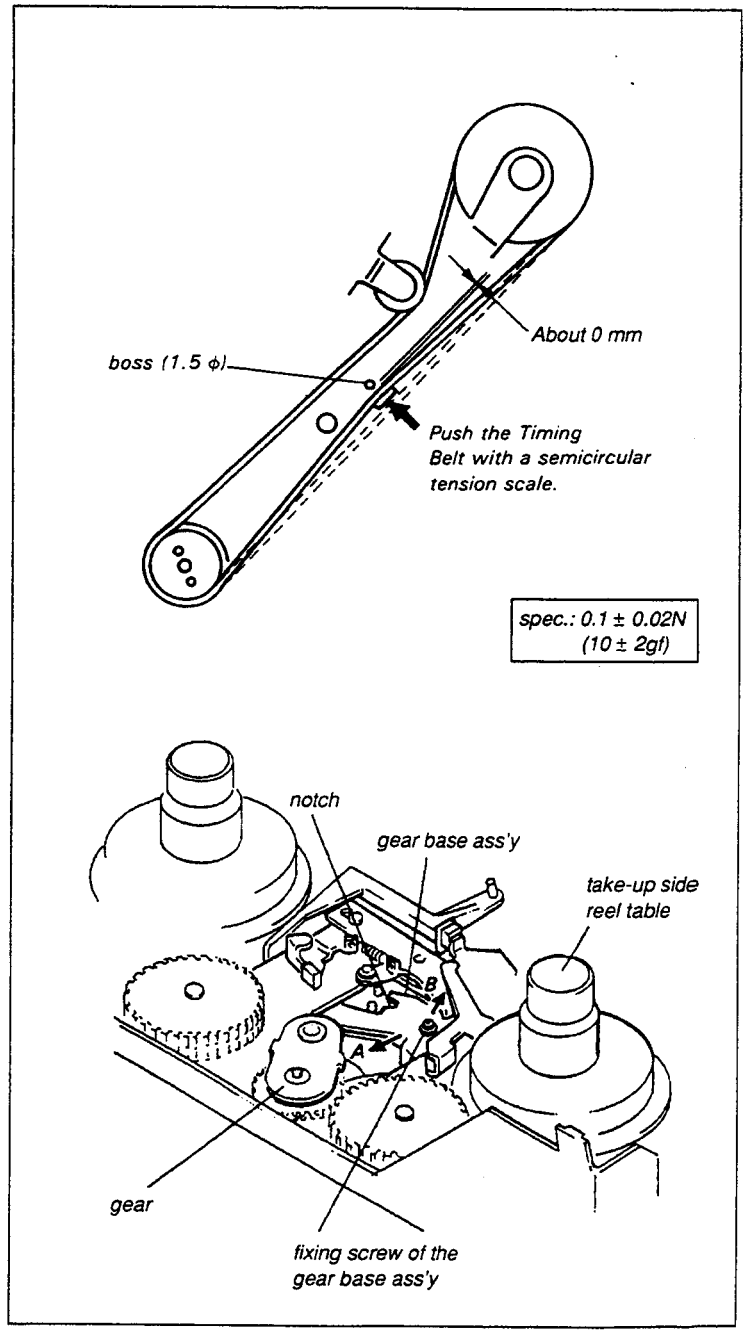
Tool: Tension scale (50 g full scale)
Mode: Any mode is acceptable. (Put the unit into the threading mode.)

Check procedure:

(1) Push the Timing Belt in the direction of the arrow with a tension scale as shown in the figure.
(2) Check that the reading of the tension scale meets the required specification, when the clearance between the boss and the Timing Belt is about 0 mm.

Adjustment procedure:

(1) Loosen the fixing screw of Gear Base Ass'y by one or two turns.
(2) Insert a flatblade screwdriver into the notch as shown in the figure, and move the Gear Base Ass'y in the direction as follows:
  - When the reading of the tension scale is smaller than the required specification : in the direction of A
  - When the reading of the tension scale is bigger than the required specification : in the direction of B
(3) Tighten the fixing screw of the Gear Base Ass'y.
(4) Perform steps (1) and (2). If the required specification is not satisfied, repeat the adjustment procedures (1) to (4).



5-2. PRESS LEVER POSITION CHECK

Tool: Blank cassette tape
Wire clearance gauge (0.1mm)

Setting: Remove the Cassette-up Compartment from the mechanical deck.

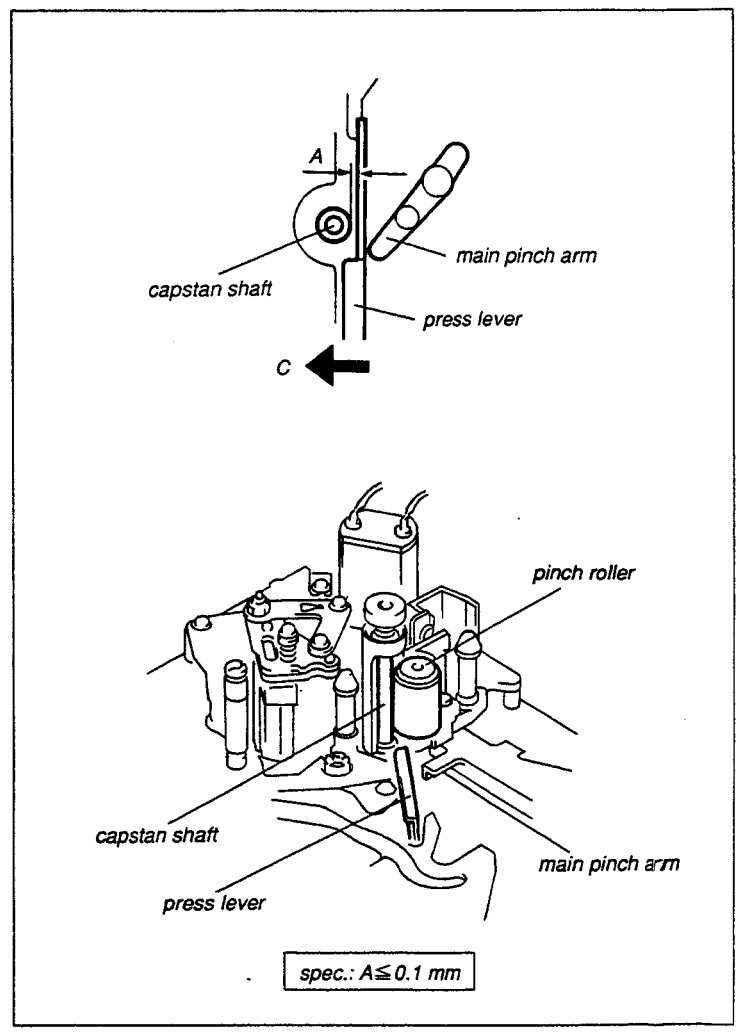
Mode: Play back the blank cassette tape and turn off the POWER switch.

Check procedure:

(1) Insert the blank cassette tape, put the unit into the PLAY mode, then turn off the POWER switch.

(2) When Pushing the Press Lever in the direction of the arrow C, check that clearance A between the capstan shaft and the Press Lever meets the required specification.

- When clearances A do not meet the required specification, perform the Pinch Press Lever Position Adjustment in Section 5-3.



5-3. PINCH PRESS LEVER POSITION ADJUSTMENT

Tool: Blank cassette tape
Wire clearance gauge (0.1, 0.2mm)

Mode: Play back and stop modes with the blank cassette tape.

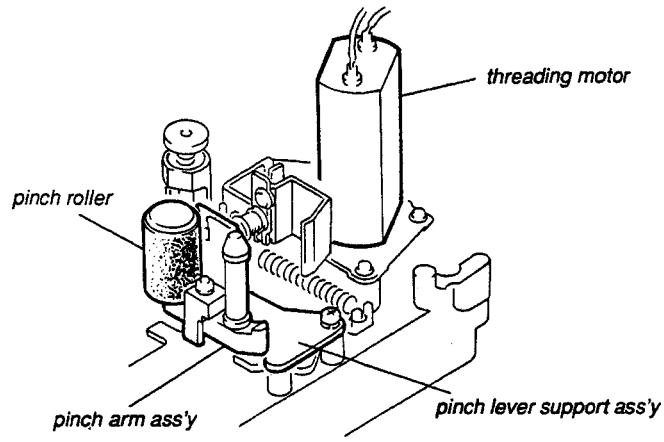
Check procedure:

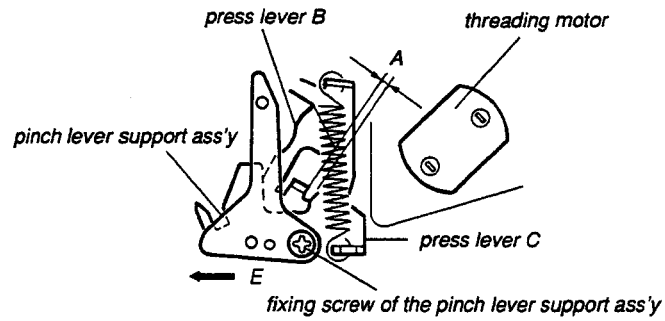
(1) Insert the blank cassette tape and put the unit into the PLAY mode.
(2) Confirm that clearance A between Press Levers (B) and (C) meets the required specification. (Spec. 1)
(3) Put the unit into the STOP mode.
(4) Confirm that clearance B between the pinch roller and the capstan shaft meets the required specification. (Spec. 2)

Adjustment procedure:

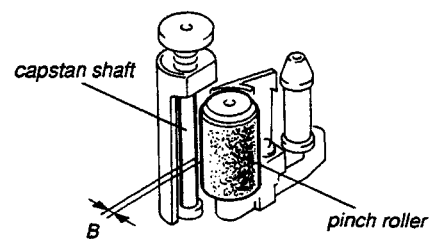
- Adjust so that clearances A and B meet the required specifications.

(1) Insert the blank cassette tape and put the unit into the PLAY mode.
(2) Loosen the fixing screw of the Pinch Lever Support Ass'y by one turn.
(3) Adjust the assembly position so that clearance A between Press Levers (B) and (C) meets the required specification, when pushing the Pinch Lever Support Ass'y in the direction of arrow E.
(4) Tighten the fixing screw of the Pinch Lever Support Ass'y.
(5) Put the unit into the STOP mode and confirm that clearance B between the pinch roller and the capstan shaft meets the required specification.
    - When the specification is not satisfied, repeat Steps (1) through (5).





Spec.1: A≧0.2 mm



Spec.2: B≧0.1 mm

5-4. THREADING POSITION CHECK (SUPPLY SIDE)

Tool: Blank cassette tape

Mode: Put the unit into the threading completion mode and turn off the POWER switch.

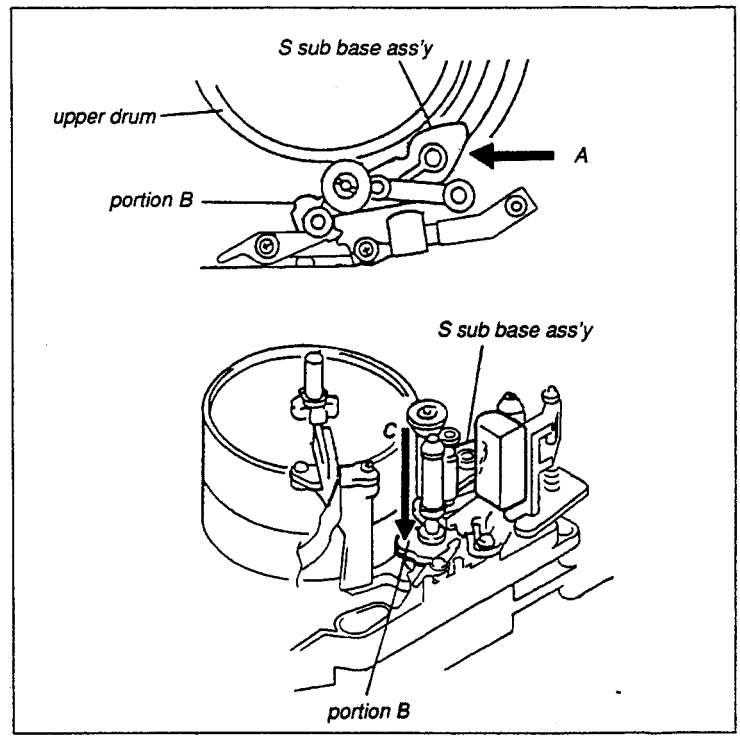
Check procedure:

(1) Insert the blank cassette tape, put the unit into the threading completion mode, then turn off the POWER switch.

(2) When Pushing the S Sub Base Ass'y in the direction of the arrow A with a flatblade precision driver (2mm), confirm that it will not move.

(3) When portion B of the S Sub Base ASS'y is pushed in the direction of the arrow C with a flatblade precision driver (2mm), confirm that it will not move in the vertical direction.

(4) Confirm that the specifications are satisfied by repeating Steps (1) through (3) two or three times.



5-5. THREADING POSITION CHECK (TAKE-UP SIDE)

Tool: Blank cassette tape

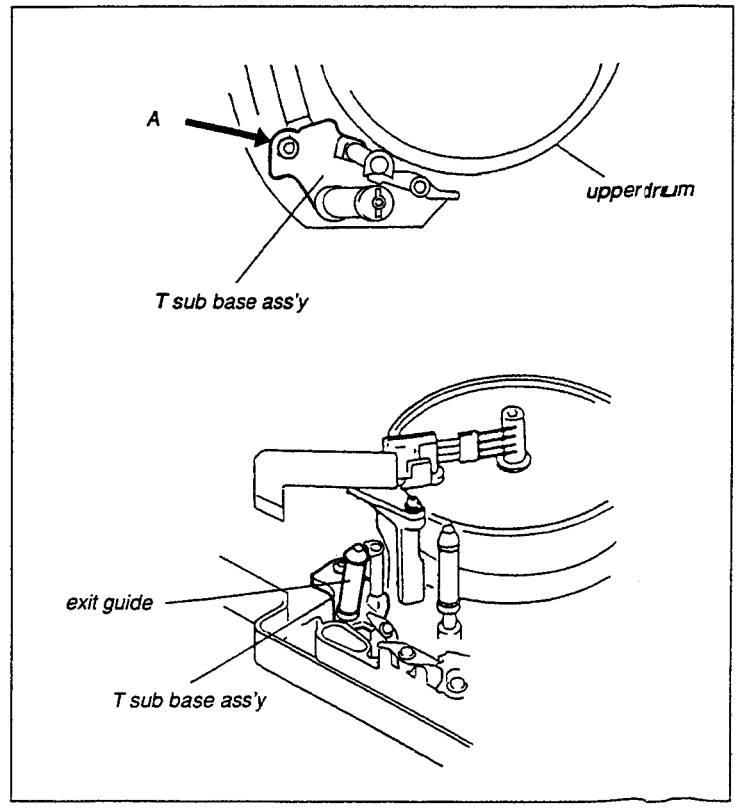
Mode: Put the unit into the threading completion mode and turn off the POWER switch.

Check procedure:

(1) Insert the blank cassette tape, put the unit into the threading completion mode, and then turn off the POWER switch.

(2) When pushing the T Sub Base Ass'y in the direction of the arrow A with a flatblade precision driver (2mm), confirm that it will not move.

(3) Confirm that the required specifications are satisfied by repeating Steps (1) through (3) two or three times.



5-6. IMPEDANCE ROLLER GUIDE II CLEARANCE ADJUSTMENT

Tool: Blank cassette tape
Wire clearance gauge (0.1mm)

Mode: Put the unit into the threading completion mode and turn off the POWER switch.

Check procedure:

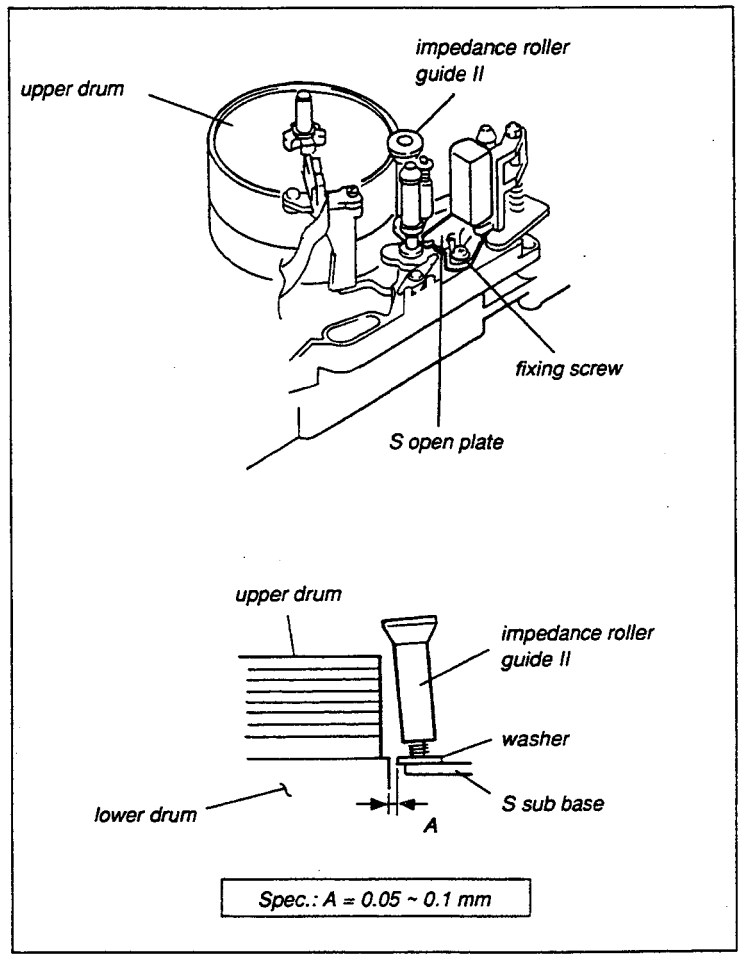
(1) Insert the blank cassette tape, put the unit into the threading completion mode, then turn off the POWER switch.

(2) Confirm that clearance A between the lower Drum Ass'y and washer meets the required specification.

Adjustment procedure:

(1) Loosen the fixing screw of the S Open Plate by one turn and adjust the S Open Plate position so that clearance A meets the required specification.

(2) Perform Steps (1) and (2) in the check procedure and confirm that the required specification is satisfied.



5-7. TENSION REGULATOR OPERATING POSITION ADJUSTMENT

Tool: Cassette tape without a lid (UVWT-30Ma) (5 minutes run portion from the tape beginnings)

Mode: Play back the cassette tape without a lid.

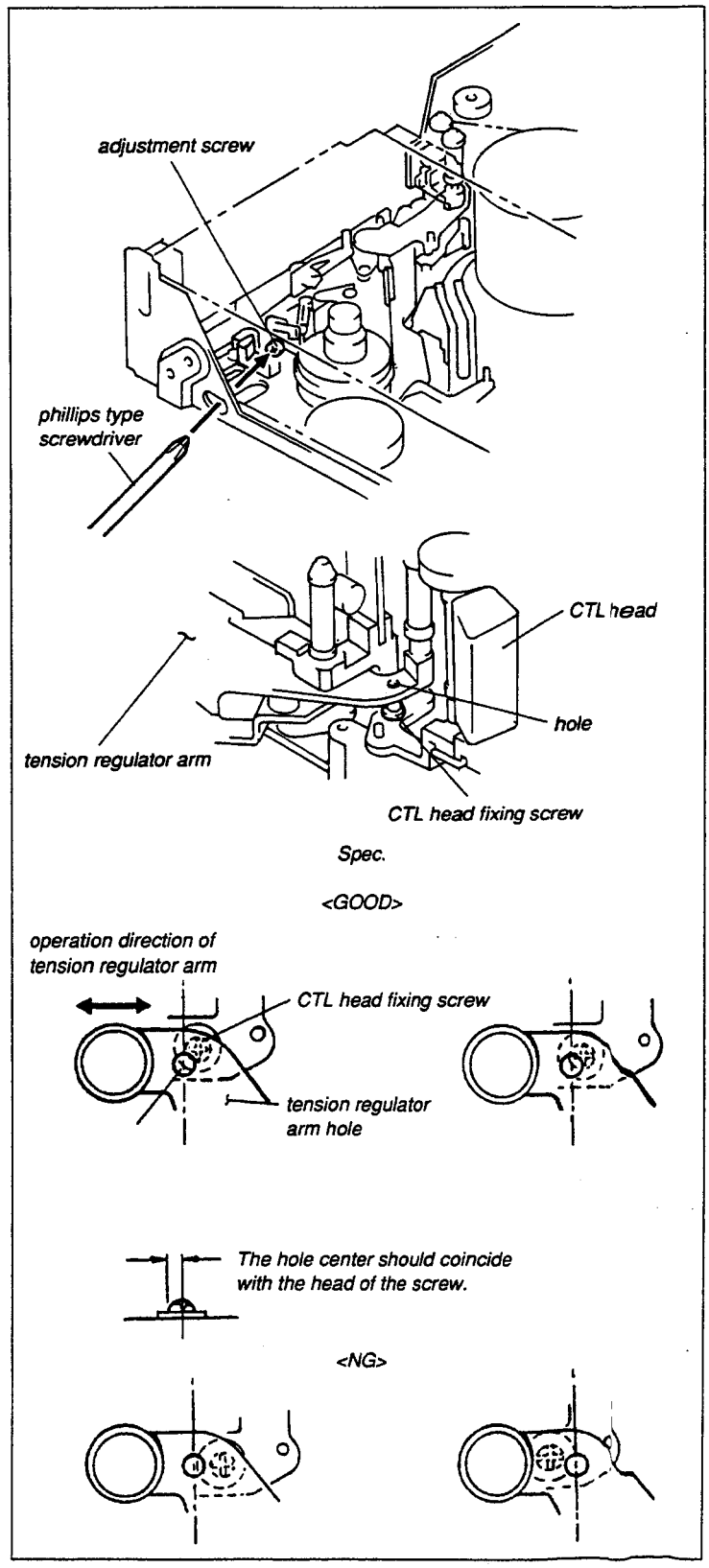
Check procedure:

(1) Confirm that the positional relationship between the Tension Regulator Arm's hole and the CTL Head Fixing Screw meets the required specification.

Adjustment procedure:

(1) Insert a phillips type screwdriver through the hole shown in the figure.

(2) Turn the adjustment screw so that the required specification is satisfied.



SECTION 6
TAPE PATH ALIGNMENT

(Related Information for tape path adjustment)

1. Maintenance Mode Operation Procedure

Refer to Section 2-23 for how to enter the maintenance menu.
Select the menu No.

No.	Adjustment
604	Tracking control operations
605	SW position adjustment

Procedure for each operation are listed below.

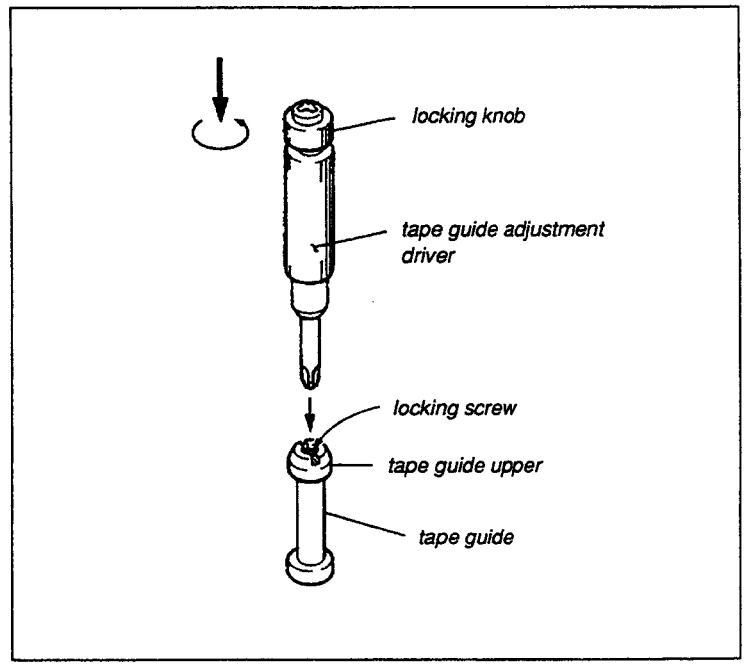
604. Tracking Control Operations Mode
- Tracking can be controlled during PLAY using the FF/REW key.
- Press the PLAY button. Tracking will be reset to the center.
- FF/REW operations can only be performed in the STOP mode.

605. SW Position Adjustment
- The SW positions can be adjusted during PLAY using the FF/REW key.
- Adjustments will be fine when only the FF/REW key is pressed. Adjustments will be rough when the PLAY and FF/REW keys are pressed together.
- The SW positions cannot be moved in modes other than PLAY.
- While this menu is being selected, the H-LOCK of the video will be set into the OFF mode.
- After adjustments, press the MENU SET key. The data will be written in the non-volatile memory and the results of the writing (Yes, No) will be shown on the LCD.
- FF/REW operation can only be performed in the STOP mode.

2. Height Adjustment Procedure of the Tape Guide

When the height adjustment of the tape guide is performed in the Tape Run Alignment, use the tape guide adjustment driver (J-6321-500-A) prepared for the maintenance tool. After the height adjustment of the tape guide is completed, tighten the locking screw of the tape guide upper flange with the torque driver referring to Section 2-4.

(1) Put the flatblade of the tape guide adjustment driver in the (-)slot of the tape guide.
(2) Push down the locking knob of the adjustment driver and turn it counterclockwise about one turn.
(3) Turn the adjustment driver and adjust the height of the tape guide.
(4) After the adjustment is completed, tighten the locking screw of the tape guide upper flange referring to Section 2-4.
(5) Apply the locking compound to the locking screw. (Never apply the locking compound to the tape running surface of the tape guide, upper and lower flanges.)



6-1. TAPE PATH ADJUSTMENT (PLAY MODE)

Tool: Cassette tape without a lid (UVWT-30Ma)
Tape guide adjustment driver
Mode: Play back the cassette tape without a lid.
Check procedure:

(1) Insert the cassette tape without a lid (UVWT-30Ma) and put the unit into the PLAY mode.
(2) Confirm that the tape runs without curl at the flanges of the TG-1, Tension Regulator Guide, TG-4, and Entrance Guide.
(3) Confirm that the tape runs without curl at the flanges of the Exit Guide, TG-8, TG-10, and TG-11.

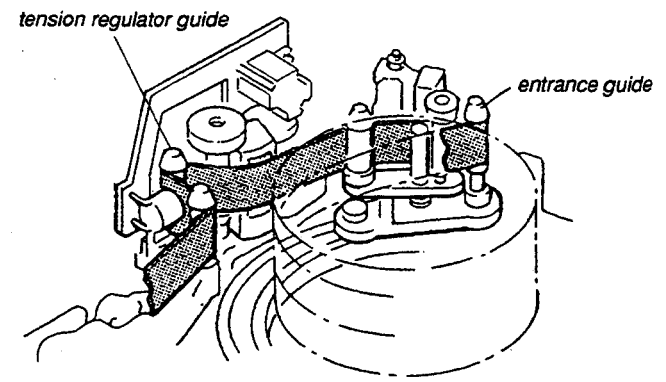
Adjustment procedure:

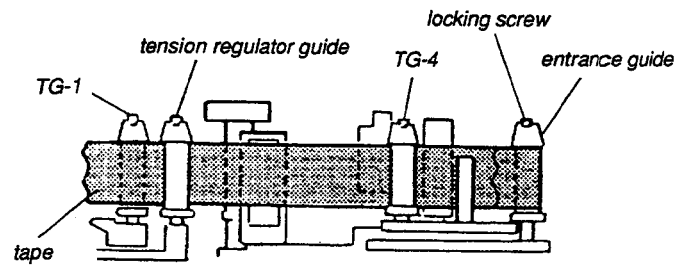
- **Tape curl at the Entrance Guide or at the lead at the drum entrance side.**

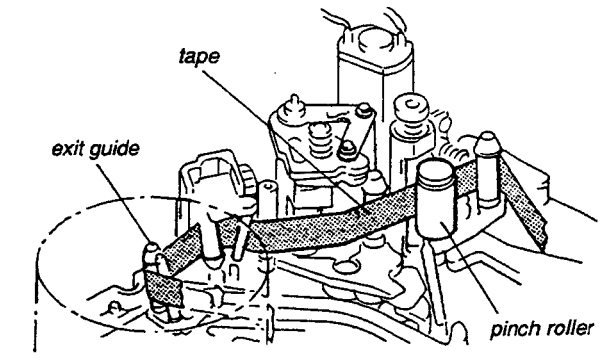
(1) Loosen the Upper Flange Locking Screw of the Entrance Guide with tape guide adjustment driver by one or two turns.
(2) Turn and adjust the flange of the Entrance Guide so that no tape curl occurs at the Upper Flange of the Entrance Guide and the tape runs along the lead at the drum entrance side.
(3) Temporarily tighten the Upper Flange Locking Screw of the Entrance Guide.
(4) Check that the tape runs without curl at the flanges of the TG-1 Tension Regulator Guide, TG-4, and Entrance Guide.

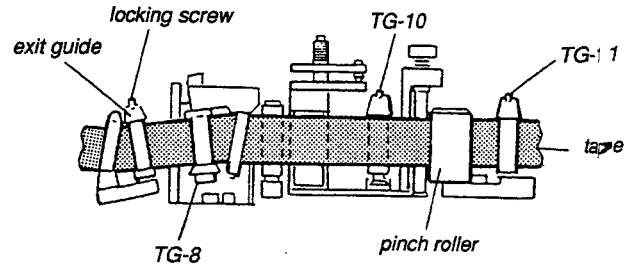
- **Tape curl at the Exit Guide or at the lead at the drum exit side.**

(5) Loosen the Upper Flange Locking Screw of the Exit Guide with a tape guide adjustment driver by one or two turns.
(6) Turn with a tape guide adjustment driver and adjust the flange of the Exit Guide so that no tape curl occurs at the Upper Flange of the Exit Guide and the tape runs along the lead at the drum exit side.
(7) Temporarily tighten the Upper Flange Locking Screw of the Exit Guide.
(8) Insert the cassette tape without a lid (UVW-30Ma), put the unit into the PLAY mode, and confirm that the tape runs without curl at the flanges of each guide.









6-2. TAPE PATH CHECK (FF AND REW MODES)

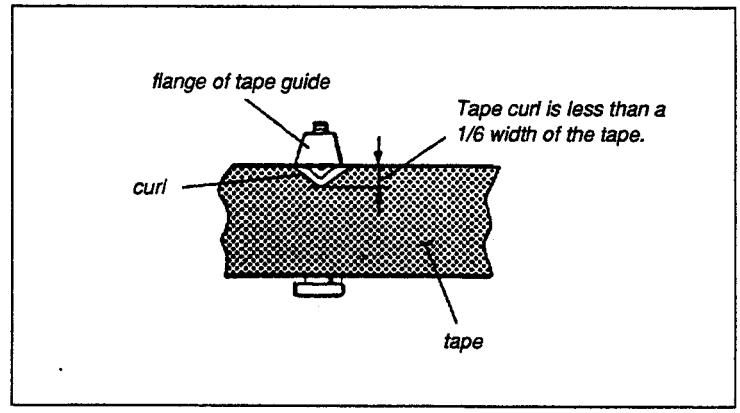
Tool: Cassette tape without a lid (UVWT-30Ma) (at the complete tape end)

Mode: Fast-forward and rewind mode with the cassette tape without a lid.

Check procedure:

(1) Insert the cassette tape without a lid (UVWT-30Ma), put the unit into the FF mode, and confirm that the tape runs without curl at the flanges of each guide. If occurs, curl less than one sixth of the tape width can be acceptable.

(2) Put the unit into the REW mode and confirm that the tape runs without curl at the flanges of each guide. If occurs, curl less than one sixth of the tape width can be acceptable.



- When the tape curl does not satisfy the required specification, perform the Tape Path Adjustment (PLAY mode) in Section 6-1 again.

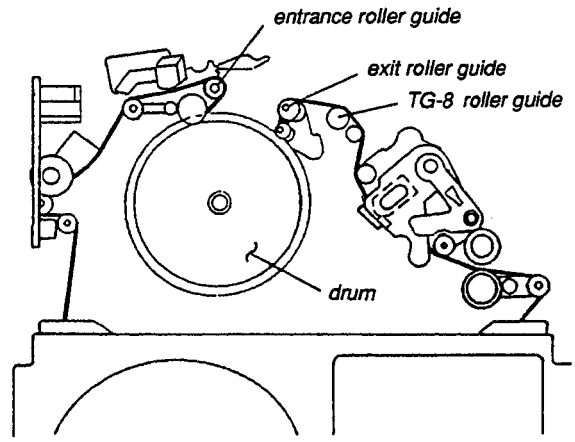
6-3. TAPE THREADING/UNTHREADING CHECK

Tool: Cassette tape without a lid (UVWT-30Ma) (at the complete tape beginning)
Cassette tape without a lid (UVWT-30Ma) (at the complete tape end)

Mode: Thread the cassette tape without a lid.

Check procedure:

(1) Thread the cassette tape without a lid at the complete tape beginning. Confirm that the tape is threaded at the upper and lower flanges of the Entrance and Exit Guide Rollers without curl at this time.
(2) Put up the mechanical deck block with the cassette tape in the upper position and drum in the lower position.
(3) Check that the threading and unthreading operatious is smooth.
(4) Repeat Steps (1) through (3) two or three times and confirm that the required specification is satisfied.
(5) Thread the cassette tape without a lid at the complete tape end.
(6) Check as in Step (1).
(7) Check as in Steps (1) through (4).



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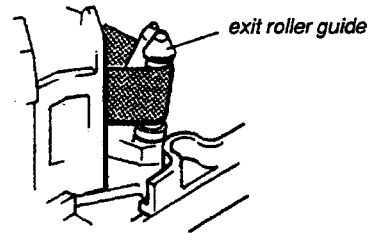

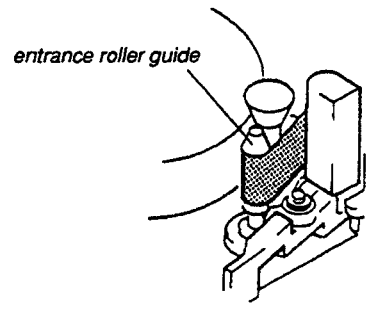

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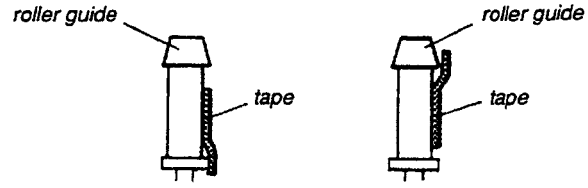


6-4. PLAY BACK TENSION ADJUSTMENT

Tool: Cassette tape without a lid (UVWT-30Ma) (5-minutes run portion from the tape beginning)
Tentelometer: T2-H7-UMC

Mode: Play back the cassette tape without a lid

Check procedure:

(1) Confirm that the tension regulator operating position meets the required specification in Section 5-7. Tension Regulator Operating Position Adjustment.

(2) Insert the Tentelometer between Full Erase Head and Guide Roller (TG-4) as shown in the figure.

(3) Confirm that the reading meets the required specification.

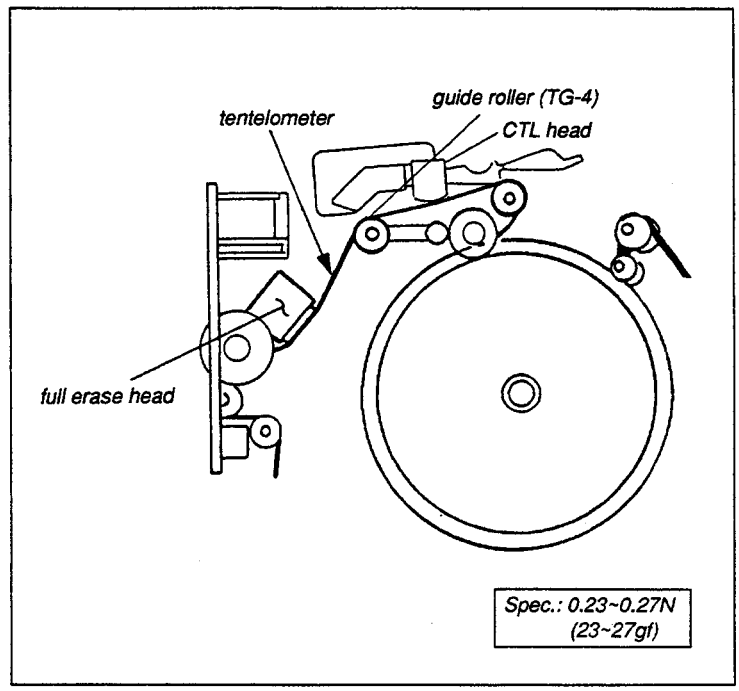
Adjustment procedure:

(1) Adjust the tension regulator operating position so that the specification is satisfied within the limits required in Section 5-7.

(2) When the required specification is not satisfied, replace the Supply Side Reel Table and Tension Regulator Band.

(3) Perform the Section 5-7. Tension Regulator Operating Position Adjustment.

(4) Perform the check procedure.



6-5. TAPE PATH ADJUSTMENT (AROUND THE PINCH ROLLER)

Tool: Cassette tape without a lid (UVWT-30Ma)

Mode: Play back the cassette tape without a lid.

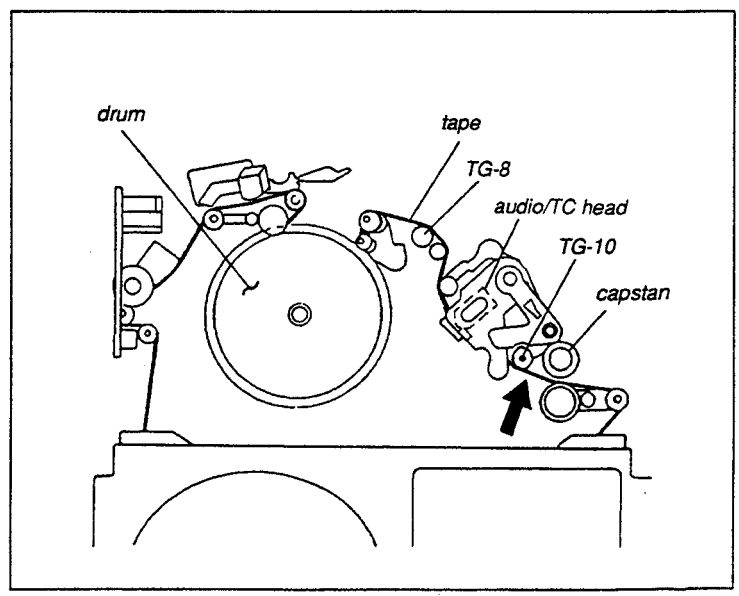
Check procedure:

(1) Insert the cassette tape without a lid (UVWT-30Ma) and put the unit into the PLAY mode.

(2) Put the unit into the PLAY and STOP modes two or three times every two or three seconds and confirm that the tape path of the designated portion (between the A/T Head and capstan shaft) indicated by the arrow satisfies the specifications below.
- No uneven tape tension occurs at the upper and lower edges of the tape.
- When the pinch roller is pressed against the capstan shaft, any tape wrinkle occurring on the tape disappears within one second.
- The tape is not damaged.

(3) After unthreading is completed, put the unit into the threading and PLAY modes two or three times.

(4) Put the unit into the PLAY mode and conrirm that the tape path of the portion indicated by the arrow meets the required specifications in Step (2).

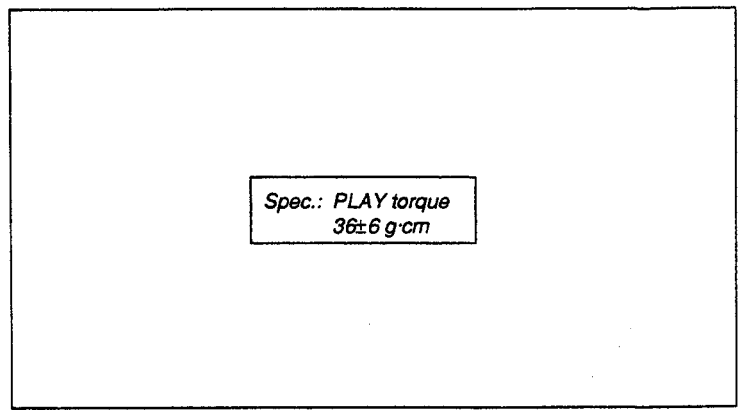


6-6. PLAY TORQUE CHECK

Tool: FWD torque cassette tape, SL-0003C
Mode: PLAY mode with torque cassette
Check procedure:

(1) Put the unit into PLAY mode with a torque cassette.
(2) After 2 or 3 seconds later, when the pinch roller is pressed against the capstan shaft, confirm that the indication of the meter on the T side of FWD torque cassette tape meets the required specification.

- When the required specification is not satisfied, replace the T Ider Ass'y.

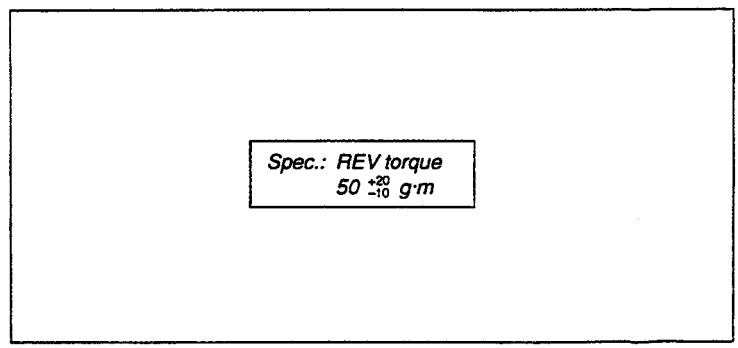


6-7. REV TORQUE CHECK

Tool: FWD torque cassette tape, SL-0003C
Mode: Insert the torque cassette tape and put the unit into the REC PAUSE mode.
Check procedure:

(1) Insert the torque cassette and switch the mode in the following order.
REC → PAUSE
(2) When the mode is changing from REC mode to PAUSE mode, the tape gets into REV mode. Confirm that the meter indication meet the specification.

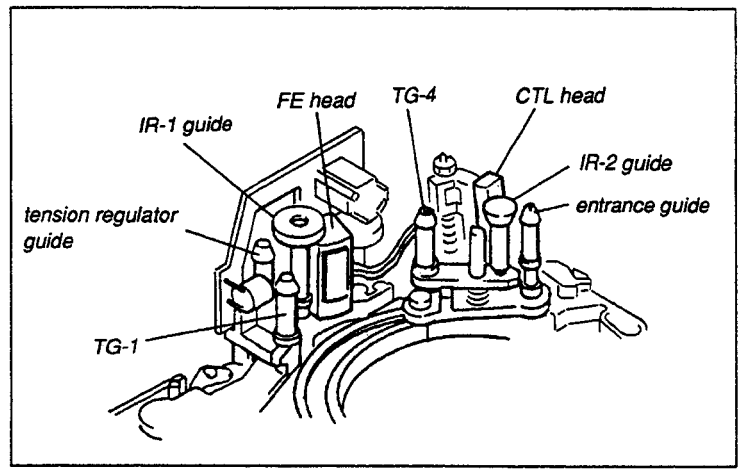
- When the required specification is not satisfied, replace the S Idler Ass'y.

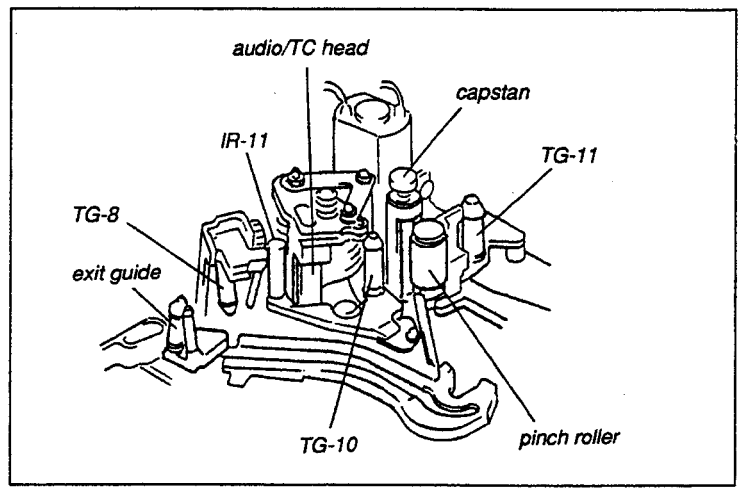


6-8. TRACKING ADJUSTMENT

- The tape guides and heads at the drum entrance side in this adjustment are illustrated.
- The tape guides and heads at the drum exit side in this adjustment are illustrated.
- Before performing the tracking adjustment, clean the tape guide, stationary head, drum, capstan shaft, and pinch roller described above with a cloth moistened with cleaning fluid.
- The drum mounts four video heads for Y and C heads, respectively. The video tracking adjustment is made with channel 1 of the Y head as reference.
- After the tracking adjustment is completed, perform the adjustment as follows:

Sec 6-1	Tape Path Adjustment (Play Mode)
Sec 6-2	Tape Path Check (FF and REW Modes)
Sec 6-9	CTL Head Height Adjustment
Sec 6-10	CTL Head Position Adjustment
Sec 6-12	Audio/Timecode Head Position Adjustment
Sec 6-13	Audio Timecode Head Height Adjustment
Sec 6-12	Audio/Timecode Head Position Adjustment (Check)
Sec 6-14	Audio Timecode Head Phase Adjustment





Tool: Alignment tape without a lid (CR2-1B/CR2-1B PS)
Dental mirror
Oscilloscope
Tape guide adjustment driver

Setting: Select MENU No. 604 from the maintenance menu.
(Refer to Section 2-23)

Mode: Play back the alignment tape.

Check procedure:

(1) Connect the oscilloscope as follows:
CH-1: TP700/VO-46/VO-46A Board (waveforms of Y head in CH1 to CH4)
CH-2: TP702/VO-46/VO-46A Board (Stair Pulse)
TRIG: TP702/VO-46/VO-46A Board (Stair Pulse)

(2) Insert the alignment tape CR2-1B/1BPS and put the unit into the PLAY mode.

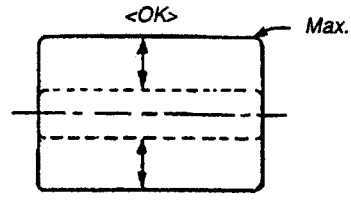
(3) Confirm that the waveforms of channels 1 through 4 of the Y head meet the required specificasions of the Steps (4) and (5).

(4) Check that the RF envelope waveform increases and decreases while remaining flat when the FF or REW button is pressed.

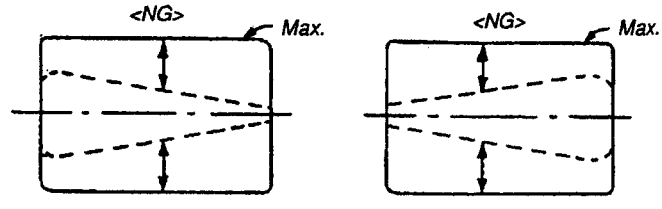
(5) Check that the RF envelope waveform head-to-tape contact and fluctuation are within the specification at the maximum amplitude.

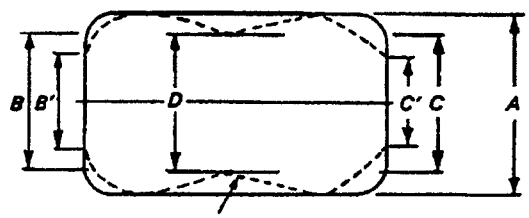
(6) Connect the oscilloscope as follows:
CH-1: TP750/VO-46/VO-46A Board (waveforms of CH1 through CH4 of C head)
CH-2: TP702/VO-46/VO-46A Board (Stair pulse)
TRIG: TP702/VO-46/VO-46A Board (Stair pulse)

(7) Confirm that the waveforms of channels 1 through 4 of the C head meet the required specifications of the Steps (4) and (5).



Increased or decreased in flat level.





RF output level deterioration due to fluctuation

$\frac{B}{A} \geq 0.8$

$\frac{C}{A} \geq 0.8$

$\frac{D}{A} \geq 0.9$

$\frac{B'}{B} \geq 0.9$

$\frac{C'}{C} \geq 0.9$

A: Maximum output level
D: Minimum output level due to fluctuation in the center portion
C, B: Maximum output level at entrance and exit side
C', B': Minimum output level due to fluctuation at entrance and exit side

Adjustment procedure:

(1) Connect the oscilloscope as follows:
CH-1: TP700/VO-46/VO-46A Board
CH-2: TP702/VO-46/VO-46A Board
TRIG: TP702/VO-46/VO-46A Board

(2) Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.

(3) Press the FF or REW button and adjust so that the maximum RF envelope waveform output is around 70% to 80%.

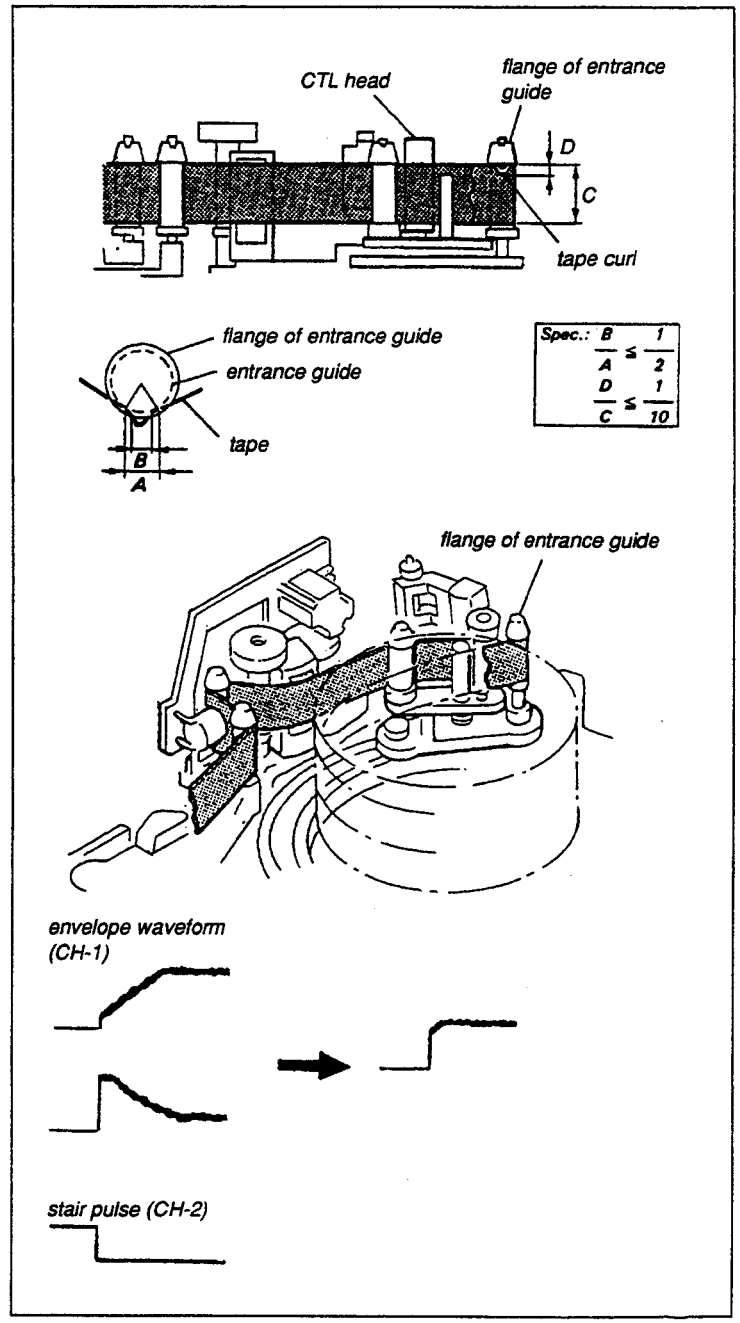
- To make a tracking adjustment at entrance side, perform Steps (4) through (8) plus Steps (14) and after. To make a tracking adjustment at exit side, perform Steps (9) through (13) plus Steps (14) and after.

(4) Loosen the Upper Flange Locking Screw of the Entrance Guide by one or two turns with the tape guide adjustment driver.

(5) Turn the upper flange of the Entrance Guide with the tape guide adjustment driver and adjust so that the required specifications below are satisfied.
  (i) The RF envelope waveform at entrance side is flat.
  (ii) No tape curl occurs at the upper flange of the Entrance Guide.
  (iii) The tape touches the lead at the drum entrance side.

(6) Tighten the Upper Flange Locking Screw of the Entrance Guide with the tape guide adjustment driver.

(7) Put the unit into the EJECT and PLAY modes two or three times and confirm that the required specifications in Step (5) are satisfied.



(8) When raised the mechanical deck with the cassette tape in the upper position and the drum in the lower position, check that the RF envelope waveform at the entrance side meets the required specification.

(9) Loosen the Upper Flange Locking Screw of the Exit Guide by one or two turns with a tape guide adjustment driver.

(10) Turn the upper flange of the Exit Guide with the tape guide adjustment tool and adjust so that the required specifications below are satisfied.
   (i) The RF envelope waveform at exit side make flat.
   (ii) No tape curl occurs at the upper flange of the Exit Guide.
   (iii) The tape touches the lead at the drum exit side.

(11) Tighten the Upper Flange Locking Screw of the Exit Guide with the tape guide adjustment driver.

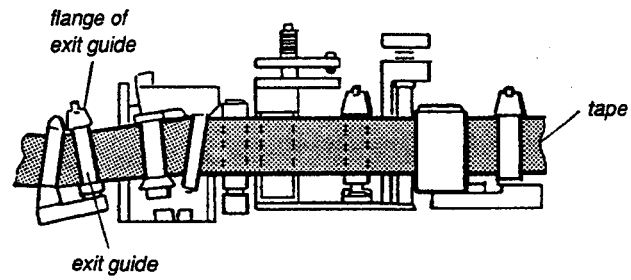
(12) Repeat the EJECT and PLAY modes two or three times and confirm that Step (10) is satisfied.

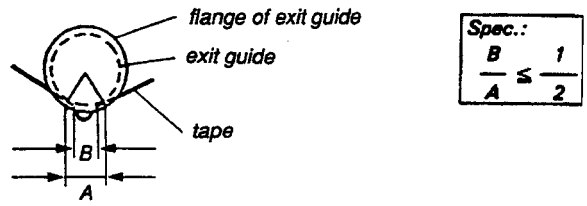
(13) When raised the mechanical deck with the cassette tape in the upper position and the drum in the lower position, confirm that the RF envelope waveform at the exit side meets the required specification.

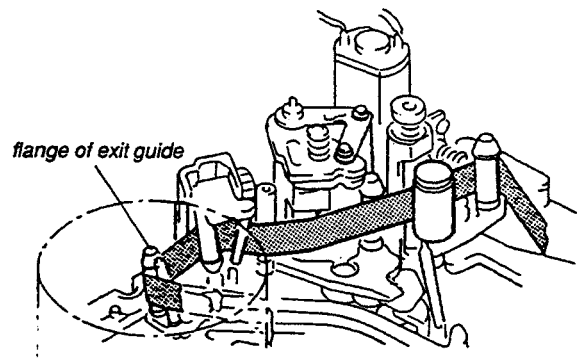
(14) Connect the oscilloscope as follows:
   CH-1: TP750/VO-46/VO-46A Board
   CH-2: TP702/VO-46/VO-46A Board
   TRIG: TP702/VO-46/VO-46A Board

(15) Check that the RF envelope waveform increases and decreases while remaining flat when the FF or REW button is pressed.

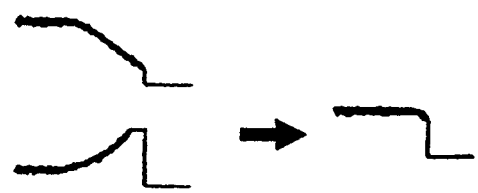
(16) Perform the adjustments as follows:
   Sec 6-1 Tape Path Adjustment (Play Mode)
   Sec 6-2 Tape Path Check (FF and REW Mode)







envelop waveform (CH-1)



stair pulse (CH-2)

6-9. CTL HEAD HEIGHT ADJUSTMENT

Tool: Alignment tape without a lid (CR8-1A)
Oscilloscope

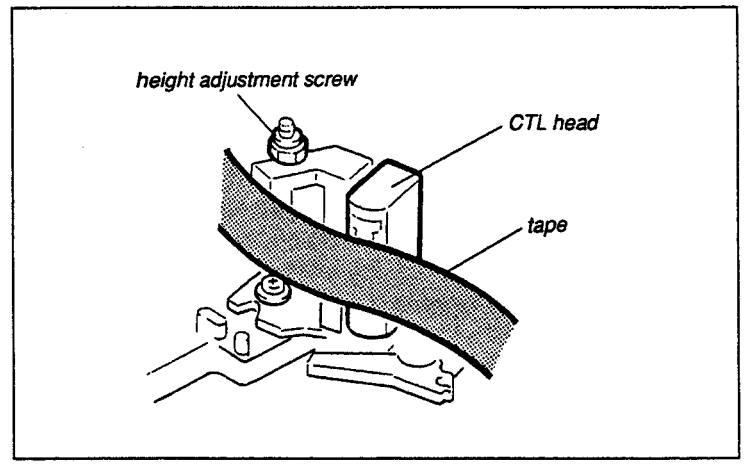
Setting: Connect the oscilloscope as follows:
CH-1:TP2/FE-18 Board

Mode: Play back the alignment tape.

Adjustment procedure:

(1) Play back a 1 kHz audio signal which is recorded on the CTL track of the alignment tape.

(2) Turn the height adjustment screw so that the output waveform is maximized.



6-10. CTL HEAD POSITION ADJUSTMENT

- The drum mounts four video heads for Y and C heads, respectively. The CTL head position adjustment is made with channel 1 of the Y head as reference.

Tool: Alignment tape without a lid (CR2-1B/CR2-1B PS)
Oscilloscope
Screwdriver –3mm

Setting: (1) Select MENU No. 604 from the maintenance menu.
(Refer to Section 2-22)
(2) Connect the oscilloscope as follows:
CH-1: TP700/VO-46/VO-46A Board
CH-2: TP702/VO-46/VO-46A Board
TRIG: TP702/VO-46/VO-46A Board

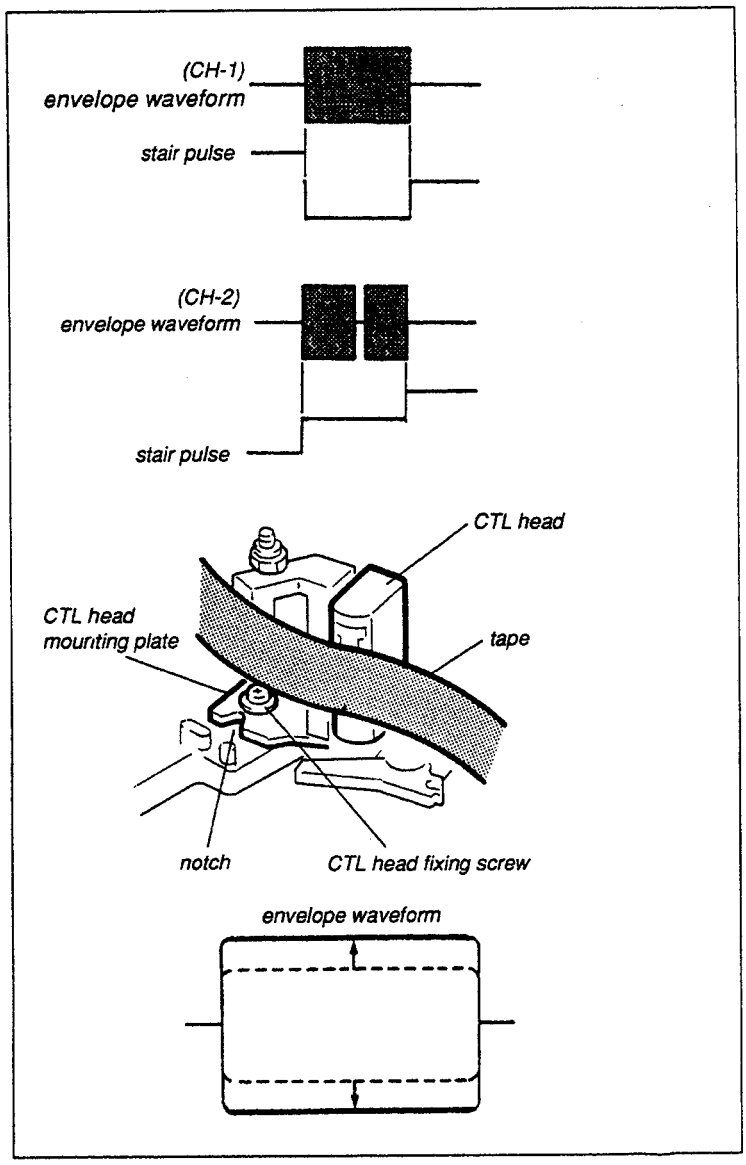
Mode: Play back the alignment tape.

Check procedure:

(1) Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.
(2) Check that the RF envelope waveform decreases when the FF or REW button is pressed. (Adjust if it increases even if it is slight.)
(3) Confirm that the relationship between the switching pulse and RF envelope waveform meets the required specification.

Adjustment procedure:

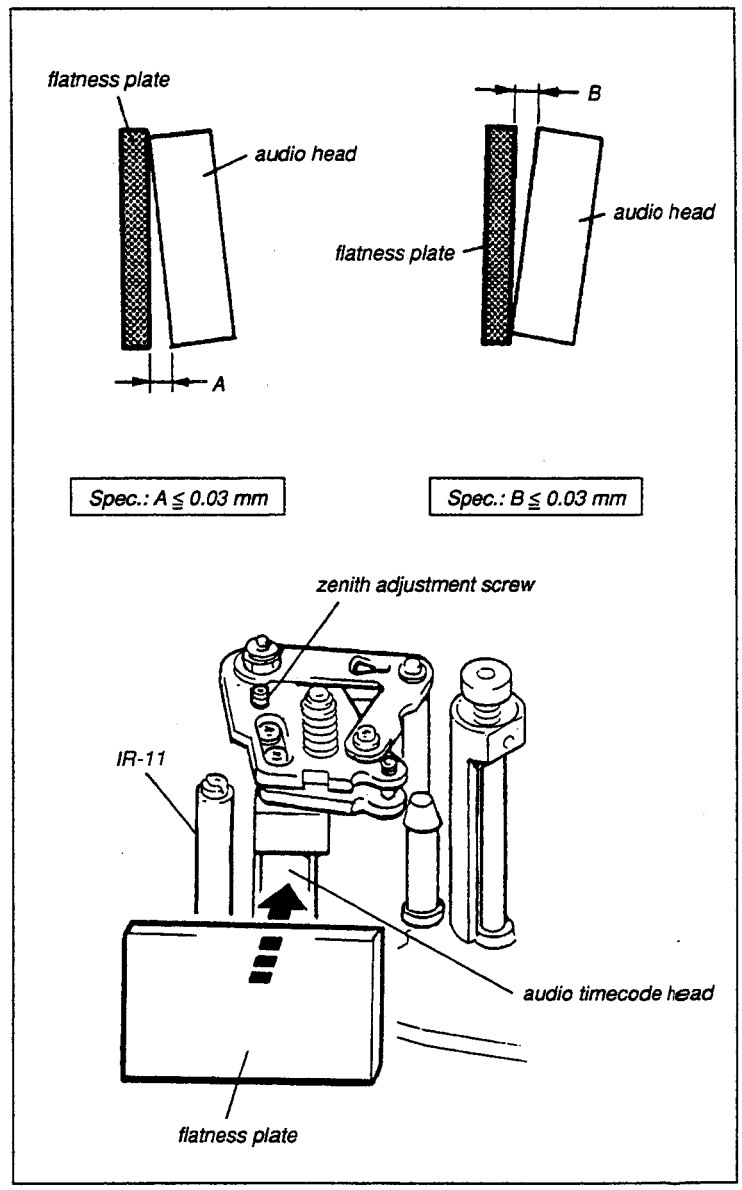
(1) Press the PLAY button and adjust the tracking to the center.
(2) Loosen the fixing screw of CTL head by 1/2 turn.
(3) Insert a flatblade 3mm screwdriver into the notch of the CTL Head Mounting Bracket and adjust the CTL head position so that the RF envelope waveform is maximum.
(4) Tighten the CTL head fixing screw.
(5) Check according to the check procedure.



6-11. AUDIO TIMECODE HEAD ZENITH ADJUSTMENT

Tool: Flatness plate
Mode: EJECT mode
Check procedure:
(1) Put the flatness plate onto the IR-11 guide and audio head.
(2) When the flatness plate is pressed onto the IR-11 guide, confirm that the clearance between the flatness plate and audio head meets the required specification.

Adjustment procedure:
(1) Adjust the Zenith Adjustment Screw so that the specification is satisfied.
(2) Adjust as follows:
Sec 6-14 Audio Timecode Head Phase Adjustment
Sec 6-12 Audio Timecode Head Position Adjustment
Sec 6-13 Audio Timecode Head Height Adjustment
Sec 6-12 Audio Timecode Head Position Adjustment



6-12. AUDIO/TIMECODE HEAD POSITION ADJUSTMENT

Tool: Alignment tape without a lid
(CR2-1B/CR2-1B PS)
Screwdriver –3 mm

Setting: Connect the oscilloscope as follows:
CH-1: TP2/FE-18 Board (CTL waveform)
CH-2: TP1/MB-506 Board (TC waveform)
TRIG: TP405/SS-57 Board (1/2 VD)

Mode: Play back the alignment tape.

Check procedure:

(1) Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.

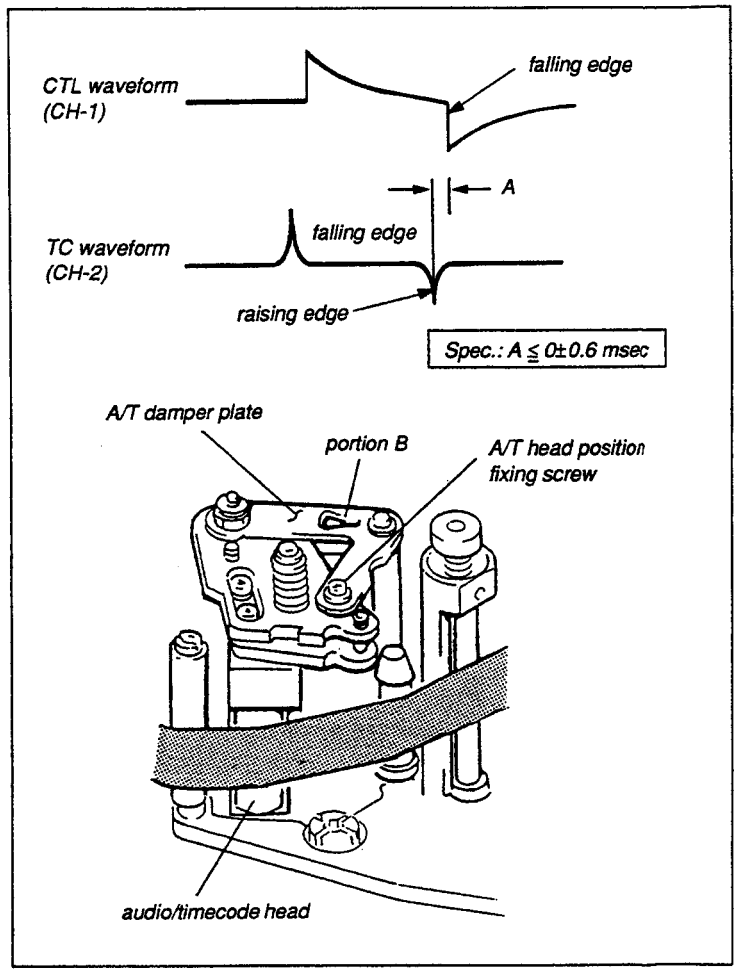
(2) Confirm that the relationship between the phase at the falling edge of the CTL waveform and that at the falling edge of the TC waveform meets the required specification.

Adjustment procedure:

(1) Loosen the A/T Head Position Fixing Screw by one or two turns.

(2) Insert a flatblade 3mm screwdriver into portion B of the A/T Damper Plate and adjust the Audio/ Timecode head position so that the required specification is satisfied.

(3) Tighten the A/T Head Position Fixing Screw and recheck.



6-13. AUDIO TIMECODE HEAD HEIGHT ADJUSTMENT

Tool: Alignment tape without a lid (CR8-1A)

Setting: (1) Connect the oscilloscope as follows:
CH-1: TP303/AU-185/185P Board
CH-2: TP403/AU-185/185P Board

Mode: Play back the alignment tape.

Check procedure:

(1) Play back an 1 kHz/0 dB audio signal on the alignment tape.

(2) When pushing up and pressing down the tape of the illustrated portion between the audio/timecode head and IR-11 Guide, confirm that the output waveform is decreased without increasing. (Perform the adjustment when the output waveform is increased.)

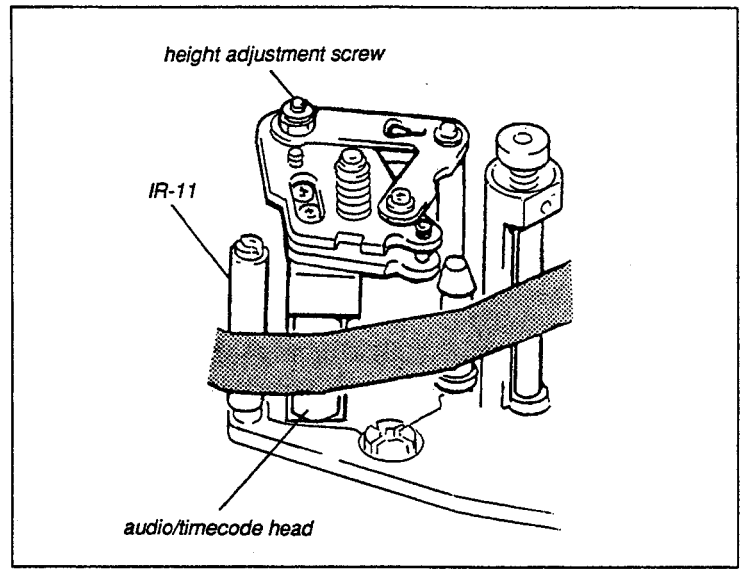
Adjustment procedure:

- When the output waveform is increased by pushing up the tape.

(1) Turn the Height Adjustment Screw clockwise so that the output waveform is maximum.

- When the output waveform is increased by pressing down the tape.

(2) Turn the Height Adjustment Screw counterclockwise so that the output waveform is maximum.



6-14. AUDIO TIMECODE HEAD PHASE ADJUSTMENT

Tool: Alignment tape without a lid (CR8-1A/CR8-1B PS)

Setting:

(1) Connect the horizontal and vertical terminals of the oscilloscope to TP303 and TP403 on the AU-185/185P Board.
(2) Play back an 1 kHz audio signal on the alignment tape.
(3) Adjust the oscilloscope for horizontal and vertical amplitudes to 6cm of a lissajous waveform.

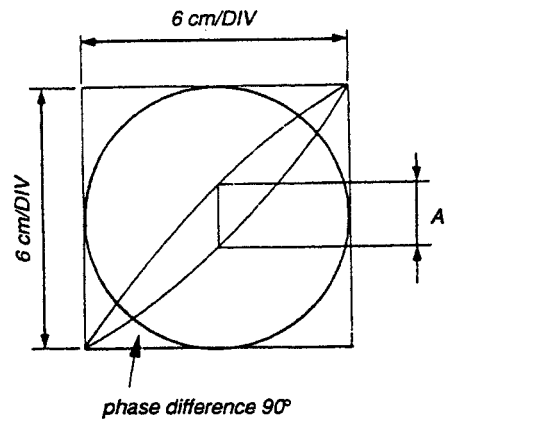
Mode: Play back the alignment tape.

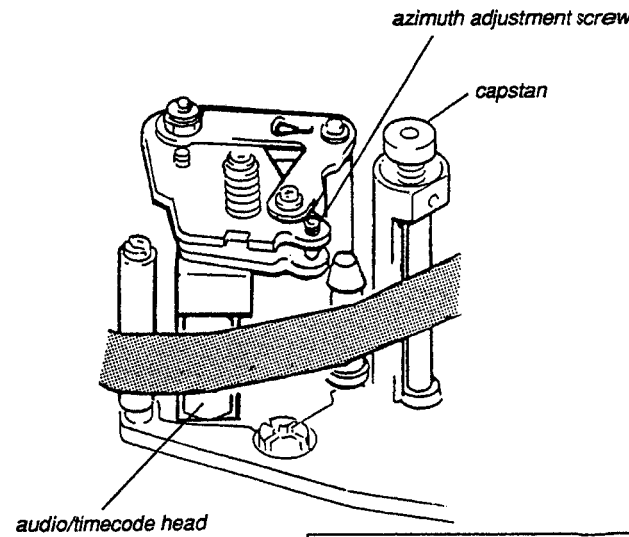
Check procedure:

(1) Play back an 1 kHz audio signal on the alignment tape.
(2) Confirm that the phase difference meets the required specification.
(3) Play back a 10 kHz/-10 dB audio signal on the alignment tape.
(4) Confirm that the phase difference meets the required specification.

Adjustment procedure:

(1) Play back 1 kHz and 10 kHz audio signals on the alignment tape.
(2) Adjust the Azimuth Adjustment Screw so that both specifications are satisfied.





Spec.: 1 kHz: A ≦ 0.52 cm (5°)
10 kHz: A ≦ 0.52 cm (5°)

6-15. PB SWITCHING POSITION ADJUSTMENT

Tool: Alignment tape, CR2-1B/CR2-1B PS

Setting:

(1) Setting:Select MENU No. 605 from the maintenance menu.
(Refer to Section 2-22.)

(2) Connect the oscilloscope as follows:
CH-1: TP700/VO-46/VO-46A board
TRIG: TP405/SS-57/SS-57A board

Mode: Play back the alignment tape.

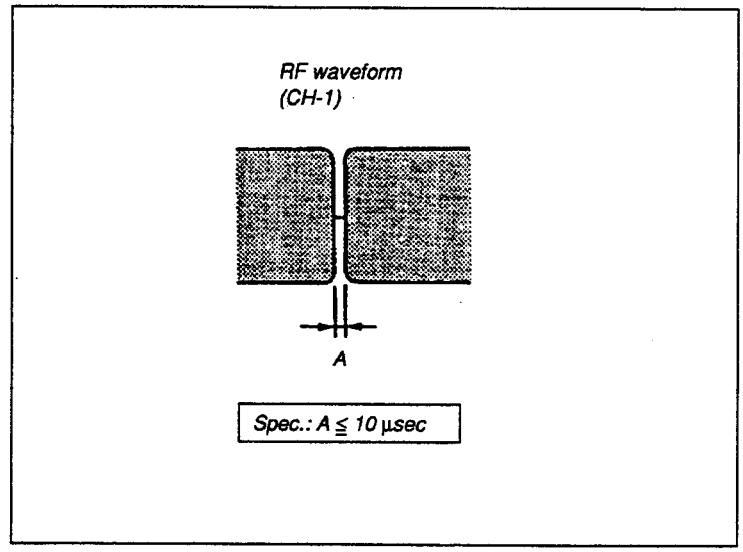
Adjustment procedure:

(1) Insert the alignment tape CR2-1B/CR2-1B PS and put the unit into the PLAY mode.

(2) Press the FF or REW button and adjust so that the CH-1 waveform satisfies the specification.
(At MENU No. 605, the switching position can be adjusted finely using the FF or REW button. It can be adjusted roughly by pressing the PLAY button together with the FF or REW button.)

(3) Press the MENU SET button and check that the writing result displayed on the LCD is "YES".

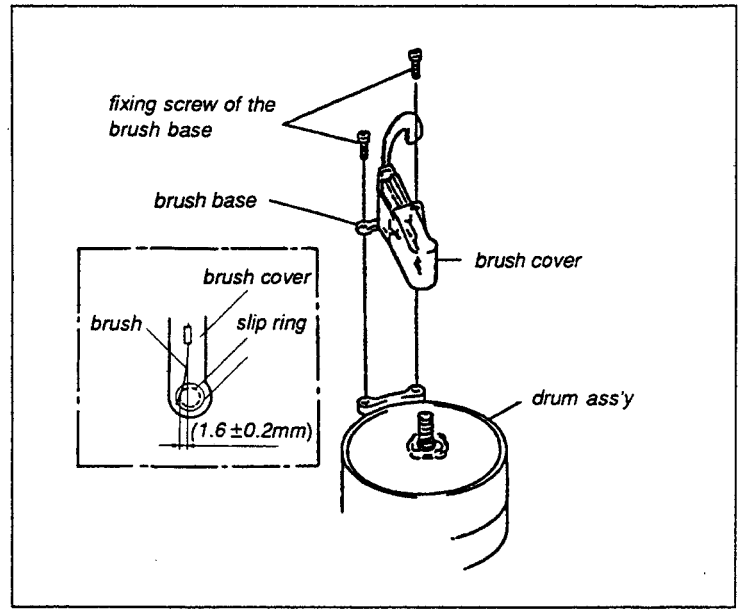
(4) If "NO" is displayed, set a maintenance menu other than MENU No. 605 and select MENU No. 605 again.
Press the MENU SET button.



6-16. BRUSH ADJUSTMENT

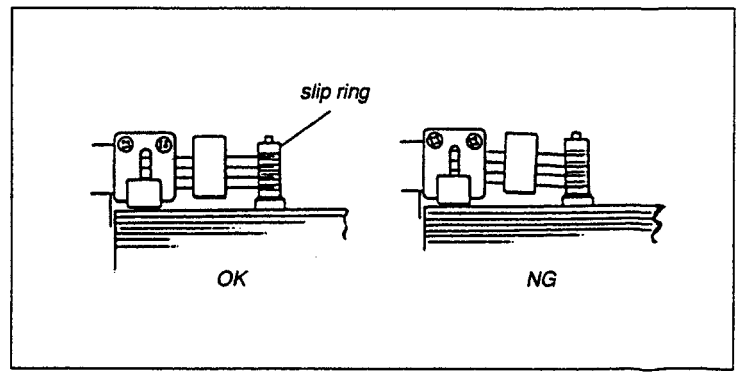
6-16-1. Brush Position Adjustment

Mode: EJECT
Check procedure:
Confirm that the slip ring and the brush are in the following status when viewed from top.
(1) Make sure that the brush is positioned as shown in the illustration with reference to the slip ring.
(2) Make sure that the slip ring is placed at the center of moldline on the brush cover.
Adjustment procedure:
(1) Loosen the two fixing screws of the Brush Base, and adjust the position of the brush base so that the specification is satisfied.



6-16-2. Brush Height Adjustment

Mode: EJECT
Check procedure:
(1) Confirm that the Brush is parallel to the Slip Ring Groove.
Adjustment procedure:
(1) Remove the Brush Base from the unit as described in Section 6-16-1. Brush Position Adjustment.
(2) Remove the Brush Cover from the Brush Base.
(3) Install the Brush Base on the unit, and loosen the two fixing screws of the Brush Base and adjust so that the specification is satisfied.
(4) After adjustment, install the Brush Cover and adjust the brush position as described in Section 6-16-1.



SECTION 7
ELECTRICAL ALIGNMENT OVERVIEW

7-1. ADJUSTMENT PART

AU-185/185P Board

CV131	CH1 BIAS LEVEL	9-14
CV231	CH2 BIAS LEVEL	9-14
LV111	CH1 REC EQ (HIGH)	9-15
LV131	CH1 BIAS TRAP	9-13
LV211	CH2 REC EQ (HIGH)	9-15
LV231	CH2 BIAS TRAP	9-13
RV111	CH1 REC LEVEL	9-14
RV112	CH1 REC EQ (MID)	9-15
RV113	CH1 REC PHASE	9-16
RV211	CH2 REC LEVEL	9-14
RV212	CH2 REC EQ (MID)	9-15
RV302	CH1 PB EQ	9-12
RV303	CH1 PB LEVEL	9-13
RV402	CH2 PB EQ	9-12
RV403	CH2 PB LEVEL	9-13
T1	BIAS TRAP	9-13

DC-63 Board

RV111	OSC FREQUENCY	9-6

ES-7 Board

LV1	MODULATION PHASE	8-7
RV1	NOISE SLICE LEVEL	8-13
RV2	Y_H LEVEL	8-14
RV3	INT CB Y LEVEL	8-6
RV4	SET UP LEVEL	8-6
RV5	INT CB SYNC LEVEL	8-6
RV6	ES WHITE CLIP LEVEL	8-16
RV7	ZEBRA LEVEL	8-17
RV8	BURST LEVEL	8-7
RV9	BURST PHASE	8-7
RV10	I CARRIER LEVEL	8-7
RV12	Q CARRIER BALANCE	8-5
RV13	I CARRIER BALANCE	8-5
RV14	CHROMA LEVEL	8-7
RV15	SUB CARRIER FREQUENCY	8-5

IE-33/33P Board

RV1	Rch VA GAIN	8-8
RV2	Gch VA GAIN	8-8
RV3	Bch VA GAIN	8-8
RV4	Rch BLACK SET	8-11
RV5	Gch BLACK SET	8-11
RV6	Bch BLACK SET	8-11
RV7	1H LEVEL BALANCE	8-7
RV8	1H GAIN	8-8
RV9	2H LEVEL BALANCE	8-7
RV10	2H GAIN	8-8
RV11	DTL MIX	8-15
RV12	H/V RATIO	8-15
RV13	Y_H MIX	8-14
RV14	BARS CK ADJUST	8-6
RV16	C. B. LEVEL 75%	8-5
RV17	C. B. LEVEL 100%	8-5

IF-454 Board

RV1	REAR VBS LEVEL	8-18
RV2	CCZ VBS/Y LEVEL	8-18
RV3	CCZ CHROMA LEVEL	8-18
RV4	VTR Y LEVEL	8-20
RV5	CCZ Y LEVEL	8-19
RV6	VTR R-Y LEVEL	8-20
RV7	CCZ R-Y LEVEL	8-19
RV8	VTR B-Y LEVEL	8-20
RV9	CCZ B-Y LEVEL	8-19

MB-530 Board

RV1	Gch RG VOLTAGE	8-4
RV2	Bch RG VOLTAGE	8-4
RV3	Rch RG VOLTAGE	8-4
RV4	Gch V-Sub VOLTAGE	8-4
RV5	Rch V-Sub VOLTAGE	8-4
RV6	Bch V-Sub VOLTAGE	8-4
RV7	+8.8V VOLTAGE	8-4

PR-208 Board

RV4 DTL LEVEL 8-15, 8-16
RV5 CRISPENING LEVEL 8-15
RV6 Gch GAMMA 8-9
RV7 KNEE POINT 8-12
RV8 PR WHITE CLIP LEVEL 8-13
RV9 Rch PRE-KNEE POINT 8-12
RV10 Gch PRE-KNEE POINT 8-12
RV11 Bch PRE-KNEE POINT 8-12
RV12 Rch PEDESTAL LEVEL 8-10, 8-11
RV13 Gch PEDESTAL LEVEL 8-9, 8-11
RV14 Bch PEDESTAL LEVEL 8-10, 8-11
RV15 Rch PR GAIN 8-10
RV16 Gch PR GAIN 8-9
RV17 Bch PR GAIN 8-10

TC-86/86A Board

CV1 CLOCK FREQUENCY 9-6
RV102 CH-1 PRESET LEVEL 9-12
RV202 CH-2 PRESET LEVEL 9-12
RV302 CH-1 METER LEVEL 9-12
RV402 CH-2 METER LEVEL 9-12
RV701 LIMITER LEVEL 9-12

VO-46/46A Board

CV200 Y REC CURRENT FREQUENCY 9-22
CV600 C REC CURRENT FREQUENCY 9-29
LV400 PLL VCO ERR 9-17
RV100 Y INPUT LEVEL 9-17
RV102 Y NON LINEAR EMPHASIS LEVEL 9-19
RV103 Y DEVIATION 9-20, 9-21
RV104 Y CARRIER 9-20, 9-21
RV105 Y REC HF LEVEL 9-19
RV200 Y REC CURRENT LEVEL 9-22
RV251 Y SLEW RATE LIMITER FREQUENCY RESPONSE 9-19
RV300 C/C DELAY 9-24, 9-34
RV301 R-Y A/D INPUT LEVEL 9-23
RV302 R-Y A/D INPUT BIAS 9-23
RV351 B-Y A/D INPUT LEVEL 9-23
RV352 B-Y A/D INPUT BIAS 9-23
RV401 Y REF SYNC POSITION 9-18
RV450 C REF SYNC POSITION 9-25, 9-33
RV500 CTDM INPUT LEVEL 9-24
RV502 C NON LINEAR EMPHASIS LEVEL 9-26
RV505 C REC HF LEVEL 9-26
RV506 C DEVIATION 9-27, 9-28
RV507 C CARRIER 9-27, 9-28
RV600 C REC CURRENT LEVEL 9-29
RV700 Y RF LEVEL CH-1 9-30
RV701 Y RF LEVEL CH-2 9-30
RV702 Y RF LEVEL CH-3 9-30
RV703 Y RF LEVEL CH-4 9-30
RV750 C RF LEVEL CH-1 9-30
RV751 C RF LEVEL CH-2 9-30
RV752 C RF LEVEL CH-3 9-30
RV753 C RF LEVEL CH-4 9-30
RV850 RF ALARM 9-30

7-2. REQUIRED EQUIPMENT

Measure Equipments

Equipment		Equivalent	Note
Oscilloscope		Tektronix 2445B	more than 200 MHz
Vectorscope		Tektronix 1750 (NTSC)/1751 (PAL)/ 1780R (NTSC)/1781R (PAL)	Setup 0
Component Signal Generator		Tektronix TSG-300 (Betacam SP Spec.)	for Betacam SP
Waveform Monitor	Component	Tektronix WFM300/WFM300A	
	Composite	Tektronix 1485R	
Spectrum Analyzer		Advantest R4131 B/D	
Sweep Generator		Shibasoku VS-12CX	
Black/White Monitor		SONY PVM-91 (NTSC)/91CE (PAL)/ 122 (NTSC)/122CE (PAL)	
Color Monitor		SONY PVM-1320 (NTSC)/1320P (PAL)	
Frequency Counter		Advantest TR5821	
Audio Signal Generator		HP 8904	Sine wave 600 kHz
Audio Distortion Analyzer		HP 339A	10 Hz through 110 kHz, 1 mV through 300 V
Audio Level Meter		HP 3400A	
Digital Voltmeter		Advantest TR6845	

Tool

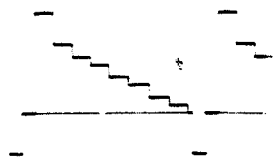
Tool	Equivalent	Note
Deviation Checker	EW-579, SONY Part No. J-6335-790-A (NTSC) EW-580, SONY Part No. J-6335-800-A (PAL)	Tool for SONY Batacam
DC Power Supply	SONY CMA-8/8A or AC-500/550 (NTSC) SONY CMA-8CE/8ACE or AC-500CE/ 550CE (PAL)	
CF Pulse Generator	SONY BVG-10	
Extension Board	EX-337, SONY Part No. J-6391-180-A	
Resolution Chart	SONY Part No. J-6026-100-A	Refer to Section 8 CAMERA Alignment
Multi Burst Chart	SONY Part No. J-6026-110-A	Refer to Section 8 CAMERA Alignment
Grayscale Chart	SONY Part No. J-6026-130-B	Refer to Section 8 CAMERA Alignment
Pattern Box (90 to 240 V AC)	PTB-500, SONY Part No. J-6029-140-B	Refer to Section 8 CAMERA Alignment
Tripod Adaptor	SONY VCT-U14	Refer to Section 8 CAMERA Alignment
Blank Tape	SONY BCT-20MA	Standard Products
Alignment Tape (Video)	CR5-1B, SONY Part No. 8-960-096-41 (NTSC) CR5-1B PS, SONY Part No. 8-960-096-91 (PAL)	Refer to Section 9 VTR System Alignment
Alignment Tape (Audio)	CR8-1A, SONY Part No. 8-960-997-45 (NTSC) CR8-1B PS, SONY Part No. 8-960-096-86 (PAL)	Refer to Section 9 VTR System Alignment
Standard Videocassette Player	SONY PVW-2600 (NTSC)/2600P (PAL)	
Input Tool		Refer to Section 9 VTR System Alignment

7-3. TEST SIGNAL

• Component Signal Generator

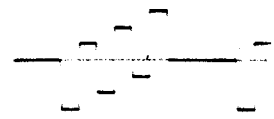
75% COLOR BARS (for NTSC)

Y



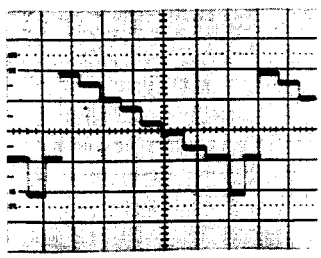
R-Y

B-Y

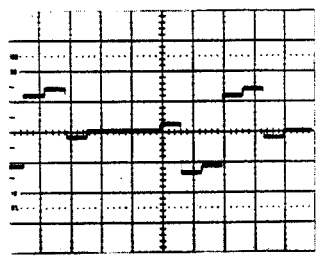


100% COLOR BARS (for PAL)

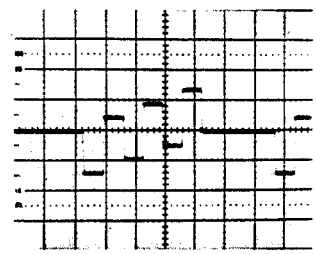
Y



R-Y

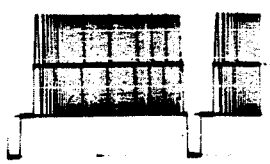


B-Y

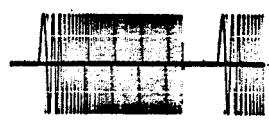


100% NALLOW LINE SWEEP

Y



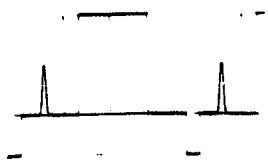
R-Y



B-Y

PULSE & BAR (2T)

Y

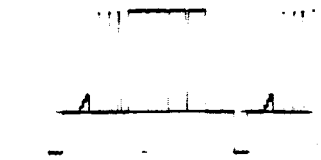


R-Y

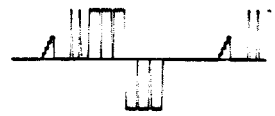
B-Y

PULSE & BAR (2.4T)

Y



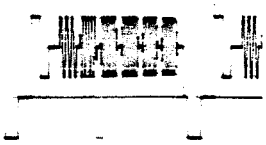
R-Y



B-Y

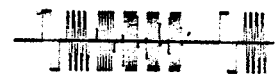
60% MULTI BURST

Y



R-Y

B-Y



BOWTIE

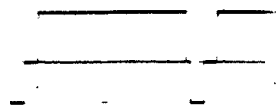
Y

R-Y

B-Y

50% FLAT FIELD

Y

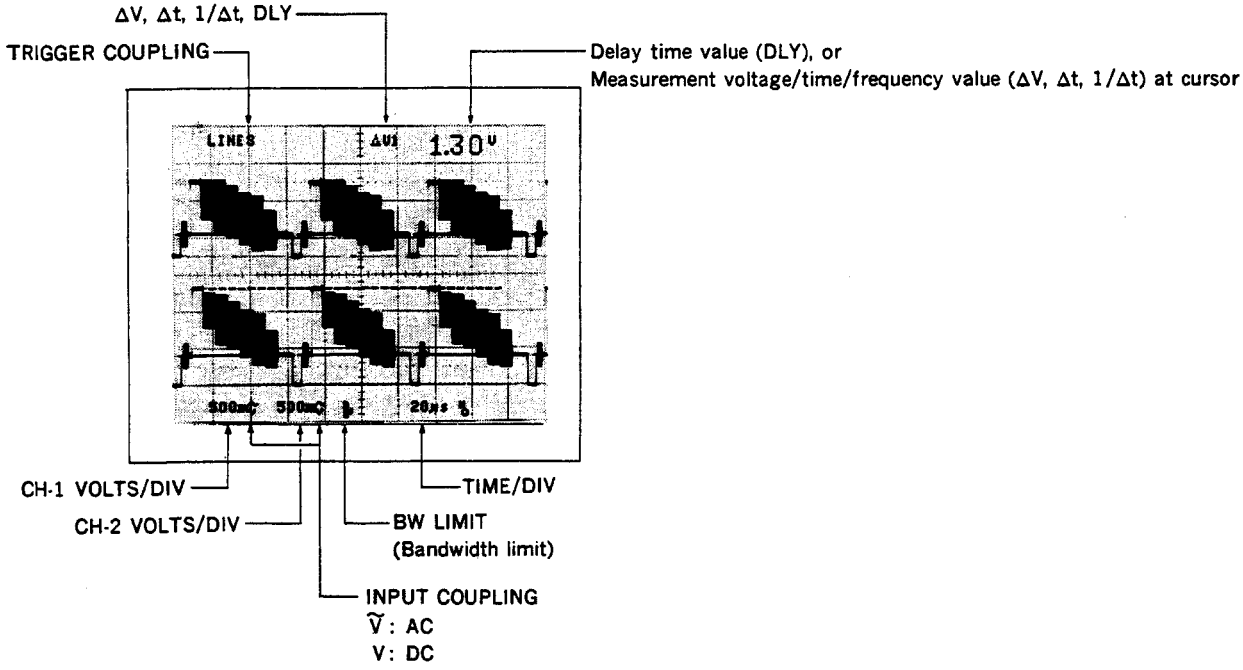


R-Y

B-Y

7-4. SETTING OF OSCILLOSCOPE

• With waveform photograph used for waveform display:
The setting conditions are displayed on the photograph as follows.

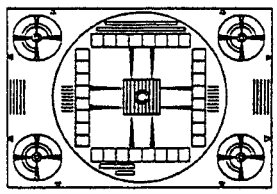
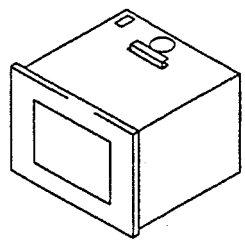
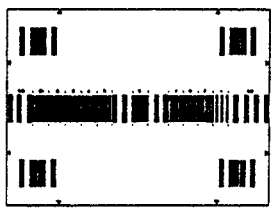
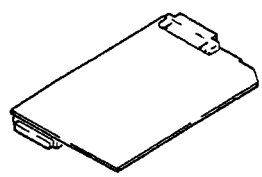
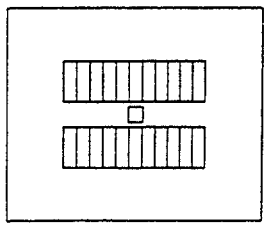
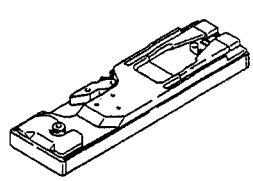


SECTION 8
CAMERA ALIGNMENT

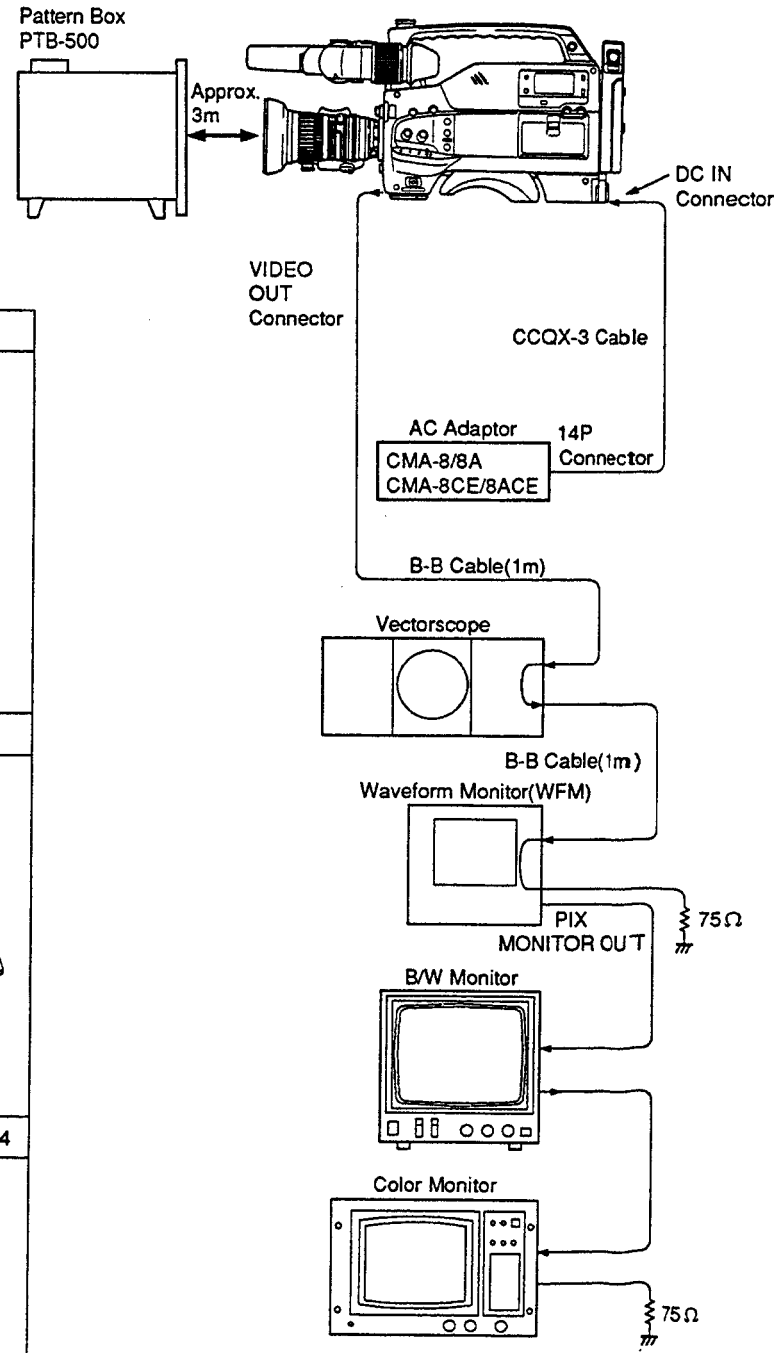
8-1. PREPARATION

8-1-1. Equipment Required

- Digital voltmeter
- Oscilloscope (100 MHz or more)
- Vectorscope
- Waveform monitor
- B/W monitor (Sony PVM-91/91CE/122/122CE or equivalent)
- Color monitor (Sony PVM-1320/1320P or equivalent)
- AC adaptor (Sony CMA-8/8CE/8A/8ACE)
- Frequency counter

Resolution Chart	Pattern Box PTB-500
Sony part No.: J-6026-100-A 	Sony part No.: J-6029-140-B • Light source for test chart Power supply AC90-240V 
Burst Chart	**Extension board EX-337**
Sony part No.: J-6026-110-A 	Sony part No.: J-6391-180-A • For adjustment of IE-33/33P, PR-208, ES-7 and IF-454 boards 
Grayscale Chart	**Tripod attachment VCT-U14**
Sony part No.: J-6026-130-B 	

8-1-2. Connection



8-1-3. Switch Setting Before Adjustment

Switch Setting of the camera side panel

GAIN switch : 0 dB
OUTPUT switch : CAM
WHITE BAL switch: PRESET
FILTER knob : 1
SHUTTER switch : OFF

IRIS(Lens) : Manual
ZOOM(Lens): Manual

IE-33/33P Board
S1(CB 75% ↔ 100%): 75% (for NTSC)

ES-7 Board
S1(VTR ↔ TEST): VTR (Upper side)

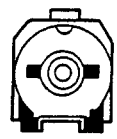
AT-85 Board
S1(FRM RESET ↔ FLD) : FLD
S2(FULL FUNC ↔ OPE) : OPE
S3(KNEE NORM ↔ OFF): KNEE NORM
S4(ADJ/OPE) : ADJ

Note: After the adjustment, return the S4(ADJ/OPE)/AT-85 board to "OPE" position.

8-1-4. Note on Adjustment

Note:

(1) As the following adjusting control has no turning stopper, take care not to over-turn it.



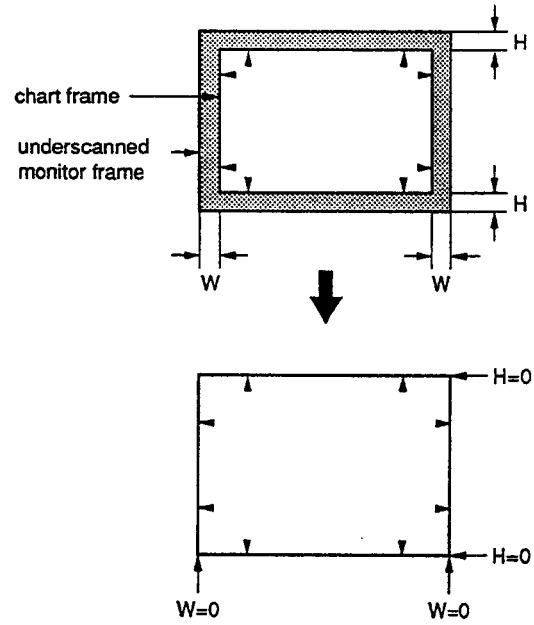
Potentiometer
Mechanical center condition

(TOP VIEW)

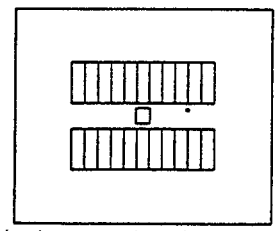
(2) Before adjustment, be sure to allow for 10-minute warm-up time.

(3) If the amplitude level of the measured waveform is blurred on the waveform monitor screen, set the RESPONSE switch on the waveform monitor to "LUM" mode.

(4) Unless otherwise specified, the sentence "chart frame = underscanned monitor frame" is written about the shooting condition.
In this case, make sure that the lens is best focused. Then adjust the zoom control of the lens so that the chart frame touches the underscanned monitor frame.

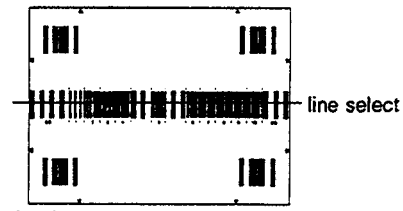


In case of the Grayscale chart:



(underscanned monitor screen)

In case of the Burst chart:



(underscanned monitor screen)

(5) When replacing the CCD unit, perform Section 8-6-3 G-CH/B-CH/R-CH Input Gain Adjustment.
After the adjustment, confirm that the Auto White Balance and the Auto Black Balance should be operated exactly.

8-1-5. Adjustment Item

8-2. POWER SUPPLY SYSTEM ADJUSTMENT
- 8-2-1. +8.8 V Adjustment

8-3. CCD DRIVE SYSTEM ADJUSTMENT
- 8-3-1. G/R/B V Substrate Voltage Adjustment
- 8-3-2. G/R/B RG Voltage Adjustment

8-4. SYNC SIGNAL SYSTEM ADJUSTMENT
- 8-4-1. Sub Carrier Frequency Adjustment

8-5. ENCODER SYSTEM ADJUSTMENT
- 8-5-1. Color-Bar 75%/100% Adjustment
- 8-5-2. Carrier Balance Adjustment
- 8-5-3. Color-Bar Size Adjustment
- 8-5-4. Int CB Y Adjustment
- 8-5-5. Color Vector Adjustment

8-6. VIDEO PROCESS SYSTEM ADJUSTMENT
- 8-6-1. 1H/2H Out Balance Adjustment
- 8-6-2. 1H/2H Gain Adjustment
- 8-6-3. G-CH/B-CH/R-CH Input Gain Adjustment
- 8-6-4. G-CH Gain/Gamma/Ped Adjustment
- 8-6-5. R-CH/B-CH Gain/Ped Adjustment
- 8-6-6. G-CH Black Set And Pedestal Adjustment
- 8-6-7. R-CH/B-CH Black Set And Pedestal Adjustment
- 8-6-8. Knee Adjustment
- 8-6-9. Pre Knee Adjustment
- 8-6-10. PR White Clip Adjustment
- 8-6-11. Y_H Crispening Adjustment
- 8-6-12. Y_H Level Adjustment
- 8-6-13. Y_H Aliasing Adjustment
- 8-6-14. DTL Crispening/DTL Aliasing Adjustment
- 8-6-15. H/V Ratio Adjustment
- 8-6-16. Detail Level Adjustment
- 8-6-17. ES White Clip Adjustment
- 8-6-18. Zebra Level Adjustment
- 8-6-19. Auto Iris Adjustment

8-7. INTERFACE SYSTEM ADJUSTMENT
- 8-7-1. Rear Video Out Level Adjustment
- 8-7-2. CCZ VBS/Y Out Level Adjustment
- 8-7-3. CCZ CF/C Out Level Adjustment
- 8-7-4. CCZ Y Level Adjustment
- 8-7-5. CCZ R-Y Level Adjustment
- 8-7-6. CCZ B-Y Level Adjustment
- 8-7-7. VTR Y Level Adjustment
- 8-7-8. VTR R-Y Level Adjustment
- 8-7-9. VTR B-Y Level Adjustment

8-2. POWER SUPPLY SYSTEM ADJUSTMENT

8-2-1. +8.8 V Adjustment

Note: If this adjustment is performed, be sure to check all of adjustment items.

Equipment : Digital voltmeter
Test point : TP7(GND:E1)/MB-530 board
Adjusting point : ⊘ RV7/MB-530 board
Specification : +8.8 ± 0.01 V dc

8-3. CCD DRIVE SYSTEM ADJUSTMENT

8-3-1. G/R/B V Substrate Voltage Adjustment

Note: Perform this adjustment only when replacing the adjusting control on the MB-530 board or replacing the mounted circuit board "MB-530" or replacing the front unit ASS'Y. When the adjusting control on the MB-530 board was turned by accident, this adjustment is required.

Equipment: Digital voltmeter
Adjustment Procedure
- Perform adjustment in order of G-CH, R-CH and B-CH as shown below.

MB-530 Board

	Test point (GND: E1)	Adjusting point
G-CH	TP4	⊘ RV4
R-CH	TP5	⊘ RV5
B-CH	TP6	⊘ RV6

Adjust to the V SUB voltage (±0.2 V) shown on the label sticking to the front unit ASS'Y.

(Example)

	Vsub	RG
R	13.5	2.0
G	13.5	2.0
B	12.5	2.0
	↑	↑
	Vdc	Vdc

8-3-2. G/R/B RG Voltage Adjustment

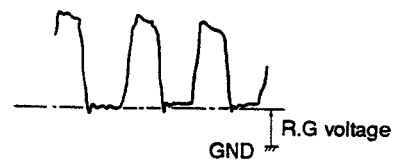
Note: Perform this adjustment only when replacing the adjusting control on the MB-530 board or replacing the mounted circuit board "MB-530" or replacing the front unit ASS'Y. When the adjusting control on the MB-530 board was turned by accident, this adjustment is required.

Equipment: Oscilloscope
Adjustment Procedure
- Perform adjustment in order of G-CH, R-CH and B-CH as shown below.

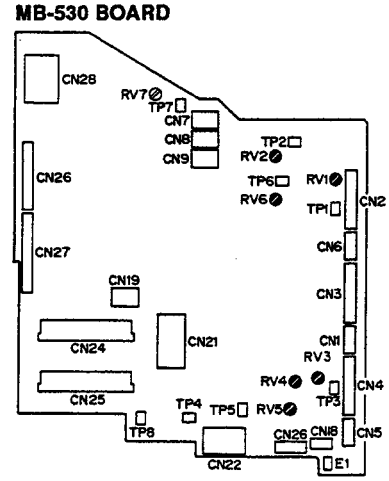
MB-530 Board

	Test point (GND: E1)	Adjusting point
G-CH	TP1	⊘ RV1
R-CH	TP3	⊘ RV3
B-CH	TP2	⊘ RV2

Adjust to the RG voltage (±0.2 V) shown on the label sticking to the front unit ASS'Y.



MB-530 BOARD



8-4. SYNC SIGNAL SYSTEM ADJUSTMENT

8-4-1. Sub Carrier Frequency Adjustment

Equipment : Frequency counter
To be extended: ES-7 Board
Test point : TP5(GND:E1)/ES-7 Board
Adjusting point : ⊘ RV15/ES-7 Board
Specification : [for NTSC] 3,579,545 ± 10 Hz
[for PAL] 4,433,618 ± 10 Hz

8-5. ENCODER SYSTEM ADJUSTMENT

8-5-1. Color-Bar 75%/100% Adjustment

Equipment : Oscilloscope
To be extended: IE-33/33P Board
Preparation : OUTPUT switch/camera side panel
→ BARS
Test point : pin A19/extension board

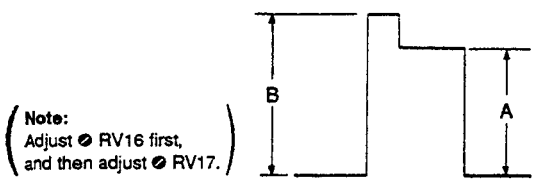
Adjustment Procedure

[For NTSC]
IE-33 Board

S1 switch	Adj. point	Specification
75% CB position	⊘ RV16	0.75 ± 0.01 V
100% CB positon	⊘ RV17	1.00 ± 0.01 V

Note: After adjustment, set S1 switch/IE-33 board to "75% CB" position.

[For PAL]
Specification : A = 0.75 ± 0.01 V; ⊘ RV16/IE-33P
B = 1.00 ± 0.01 V; ⊘ RV17/IE-33P



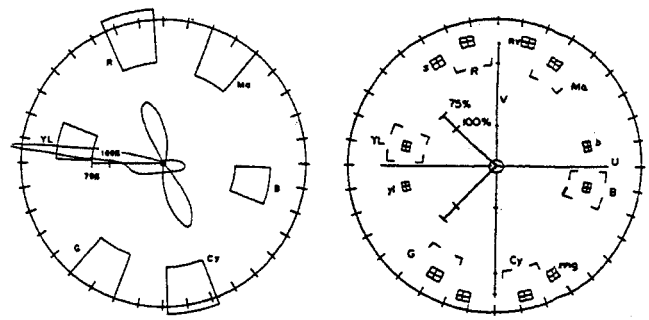
Note:
Adjust ⊘ RV16 first, and then adjust ⊘ RV17.

8-5-2. Carrier Balance Adjustment

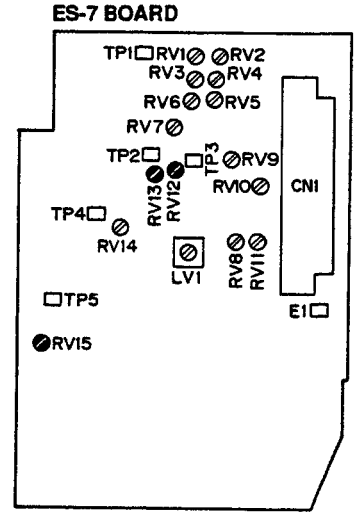
Equipment : Vectorscope (MAX GAIN)
To be extended: ES-7 Board
Preparation : OUTPUT switch/camera side panel
→ BARS

Adjustment Procedure
Adjust ⊘ RV12 and ⊘ RV13/ES-7 board so that the black beam spot is positioned in the center of the vectorscope screen.

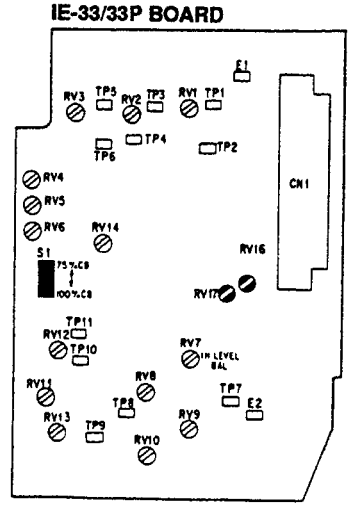
[for NTSC] **[for PAL]**



ES-7 BOARD



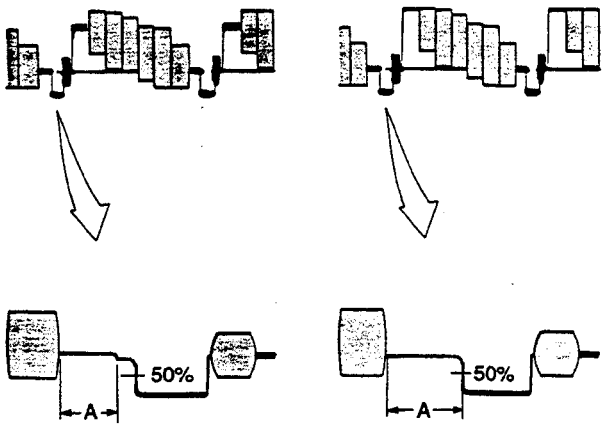
IE-33/33P BOARD



8-5-3. Color-Bar Size Adjustment

Equipment : Oscilloscope
To be extended : IE-33/33P Board
Preparation : OUTPUT switch/camera side panel → BARS
Adjusting point : ⊘ RV14/IE-33(33P) Board
Specification : A = 4.0 ± 0.2 µs [for NTSC]
A = 5.3 ± 0.2 µs [for PAL]

[for NTSC] **[for PAL]**



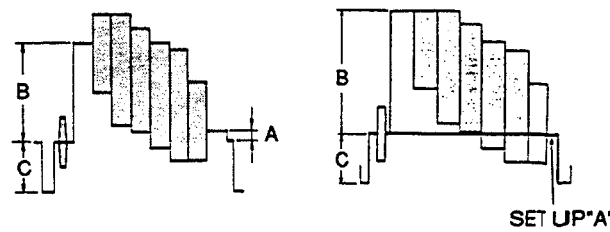
8-5-4. Int CB Y Adjustment

Equipment : Waveform monitor
To be extended : ES-7 Board
Preparation : OUTPUT switch/camera side panel → BARS

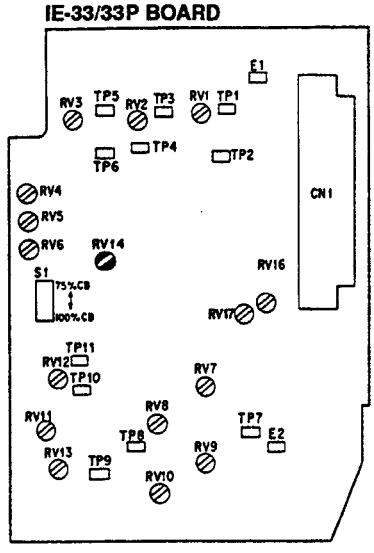
Adjustment Procedure

1. Adjusting point : ⊘ RV4/ES-7 Board
   Specification :
   [for NTSC]
   A = 7.5 ± 0.5 IRE
   [for PAL]
   Adjust ⊘ RV4 so that the SET UP level "A" is 0 mV.
2. Adjusting point : ⊘ RV3/ES-7 Board
   Specification : [for NTSC] B = 75 ± 2 IRE
   [for PAL] B = 700 ± 10 mV
3. Adjusting point : ⊘ RV5/ES-7 Board
   Specification : [for NTSC] C = 40 ± 2 IRE
   [for PAL] C = 300 ± 10 mV

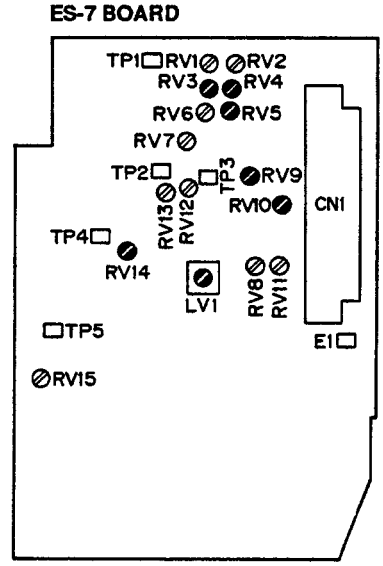
[for NTSC] **[for PAL]**



IE-33/33P BOARD



ES-7 BOARD

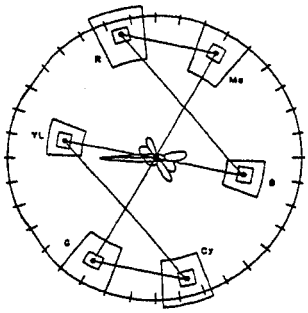


8-5-5. Color Vector Adjustment

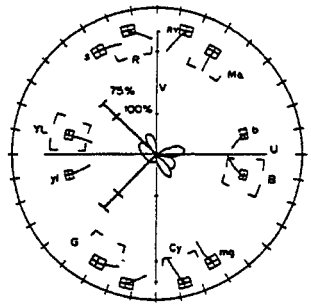
Equipment : Vectorscope
To be extended: ES-7 Board
Preparation :
- GAIN switch/Vectorscope → 75% CAL
- Adjust the PHASE control on the vectorscope so that the burst spot is overlapped to the 75% axis.
- OUTPUT switch/camera side panel → BARS

Adjustment Procedure
1. Adjust ⊘ RV8/ES-7 board so that the burst spot is located at 75% scale mark on the vectorscope screen.
2. Adjust the following controls alternately so that each beam spot stays inside the reference frame "⊞".
   - ⊘ LV1/ES-7 board
   - ⊘ RV9/ES-7 board
   - ⊘ RV10/ES-7 board
   - ⊘ RV14/ES-7 board
3. Repeat procedure 1 through procedure 2 several times.

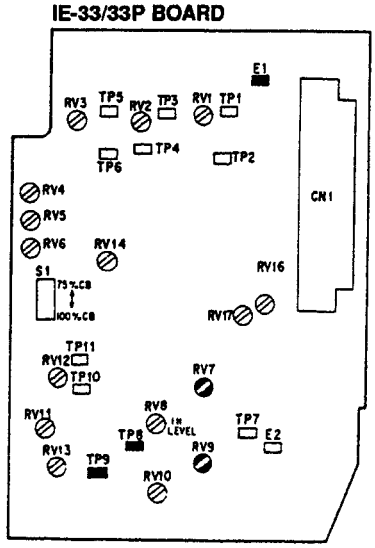
[for NTSC]



[for PAL]



IE-33/33P BOARD

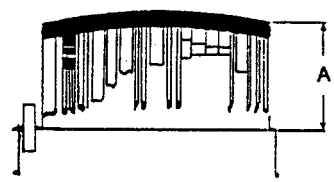


8-6. VIDEO PROCESS SYSTEM ADJUSTMENT

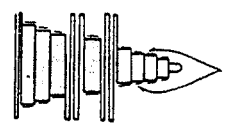
8-6-1. 1H/2H Out Balance Adjustment

Note: Perform the adjustment only when changing the following delay lines
- for IC14 or IC15: 1H OUT BALANCE ADJ.
- for IC16 or IC17: 2H OUT BALANCE ADJ.

Object : Burst chart
Equipment : Oscilloscope, Waveform monitor
To be extended: IE-33/33P Board
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. Adjust the lens iris so that the 0.5 MHz level "A" at the VIDEO OUT is 100 ± 2 IRE[for NTSC] or 700 ± 10 mV [for PAL].



3. 1H OUT BALANCE ADJUSTMENT
   Test point: TP8(GND:E1)/IE-33(33P) board.
   (To get the following picture, set the LINE SEL switch on the waveform monitor to "15 LINES". And select the center of the monitor screen by using the VAR control of LINE SEL.)
   Adjusting point: ⊘ RV7/IE-33(33P) board
   Specification : Make sure that a double waveform does not appear.

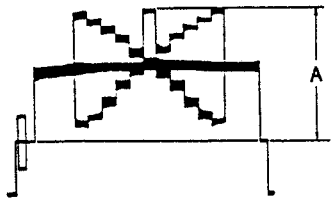


Make sure that a double waveform does not appear

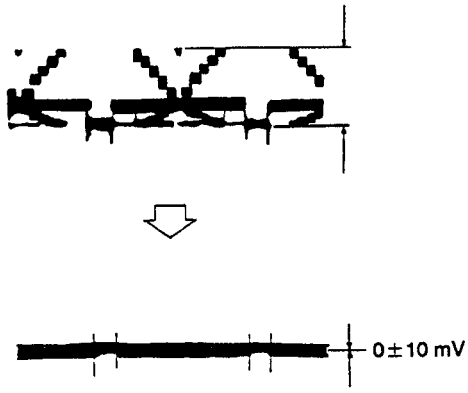
4. 2H OUT BALANCE ADJUSTMENT
   Perform the following adjustment in the same manner as the procedure 3.
   Test point : TP9(GND:E1)/IE-33(33P) board.
   Adjusting point: ⊘ RV9/IE-33(33P) board

8-6-2. 1H/2H Gain Adjustment

Object : Grayscale chart
Equipment : Oscilloscope, Waveform monitor
To be extended: IE-33/33P Board
Preparation :
• WHITE BAL switch/camera side panel → PRESET
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. Adjust the lens iris so that the video level "A" at VIDEO OUT is 100 ± 2 IRE(for NTSC) or 700 ± 10 mV(for PAL).



3. Set the oscilloscope to GAIN ADD mode and to CH-2 INVERT mode.
4. Connect CH-1 and CH-2 of oscilloscope to TP7 (GND: E1) on the IE-33/33P board. Adjust CH2-VAR control on the oscilloscope so that the waveform becomes flat for gain correction.
5. Connect CH-1 of oscilloscope to TP7 and CH-2 to TP8 on the IE-33/33P board.
6. Adjust ⊘ RV8/IE-33(33P) board so that the waveform becomes flat.

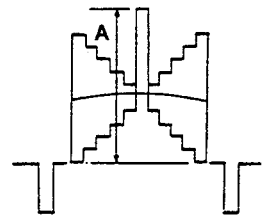


7. Adjust ⊘ RV10(2H GAIN)/IE-33(33P) board in the same manner as the procedure 3 through 6.
   Test point: Oscilloscope CH1 TP7/IE-33(33P)
   CH2 TP9/IE-33(33P)

8-6-3. G-CH/B-CH/R-CH Input Gain Adjustment

Note: Use a reflecting grayscale chart if possible.Adjust the lighting so that the chart area is exactly 3200K of color temperature. Ensure that the chart is lit to 2000 lux and is 89.9% reflectance.
When the pattern box is used, well maintained pattern box should be used.

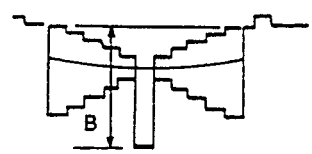
Object : Grayscale chart
Equipment : Oscilloscope
To be extended: IE-33/33P Board
Preparation :
• WHITE BAL switch/camera side panel → PRESET
• OUTPUT switch/camera side panel → CAM
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. Test point : TP3(GND: E1)/IE-33(33P) Board
   Adjusting point: Lens iris
   Specification : A = 260 ± 5 mV



3. Perform adjustment in order of G-CH, R-CH and B-CH as shown below.

IE-33/33P Board

	Test point (GND: E1)	Adjusting point	Spec.
G-CH	TP4	⊘ RV2	B = 115 ± 5 mV
R-CH	TP2	⊘ RV1	
B-CH	TP6	⊘ RV3	

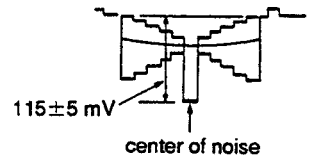


8-6-4. G-CH Gain/Gamma/Ped Adjustment

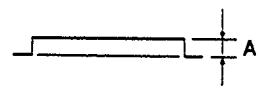
Note: • The item 8-6-3. G-CH/B-CH/R-CH Input Gain Adjustment must be complete before beginning this adjustment.
• When this adjustment is done, perform Section 8-6-5. R-CH/B-CH Gain/Ped Adjustment through Section 8-6-10. PR White Clip Adjustment continuously.

Object : Grayscale chart
Equipment : Oscilloscope
To be extended: PR-208 Board
Preparation :
- RV7/PR-208 board → fully counterclockwise
- RV8/PR-208 board → fully clockwise
- RV9/PR-208 board → fully counterclockwise
- RV10/PR-208 board → fully counterclockwise
- RV11/PR-208 board → fully counterclockwise

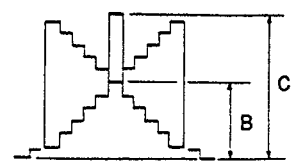
GAIN switch/camera side panel → 0 dB
Trigger: pin A10/extension board
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. Adjust the lens iris so that the video level at pin A26(GND:pin B1)/extension board is 115 ± 5 mV.



3. Put the cap on the lens.
4. Test point : pin B21(GND: pin B1)/extension board
   Adjusting point : RV13/PR-208 Board
   Specification : [for NTSC] A = 25 ± 2 mV
   [for PAL] A = 30 ± 2 mV



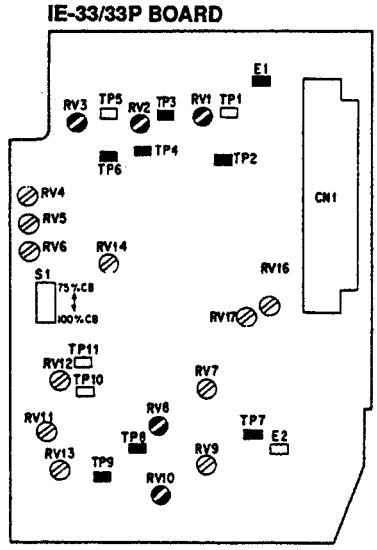
5. Remove the cap from the lens.
6. Test point : pin B21(GND: pin B1)/extension board
   Specification: B = 550 ± 20 mV; RV6/PR-208
   C = 1000 ± 10 mV; RV16/PR-208



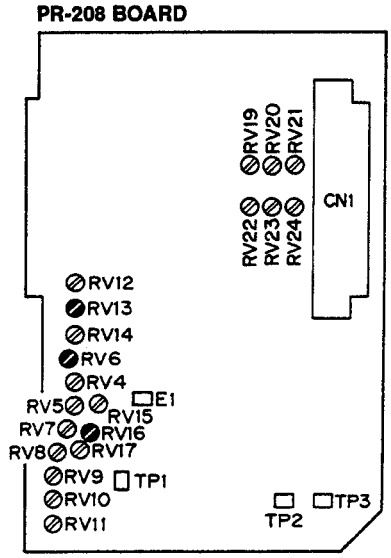
7. Repeat procedure 3 through procedure 6 several times.

Note: After the adjustment, carry out the Section 8-6-5. R-CH/B-CH Gain/Ped Adjustment.

IE-33/33P BOARD



PR-208 BOARD

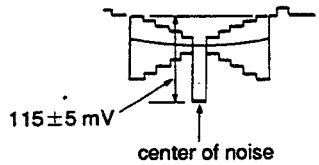


8-6-5. R-CH/B-CH Gain/Ped Adjustment

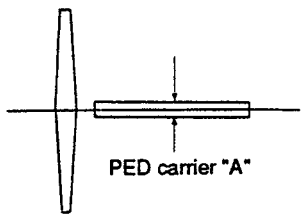
Note: The item 8-6-4. G-CH Gain/Gamma/Ped Adjustment must be done before this adjustment.

Object : Grayscale chart
Equipment : Waveform monitor
To be extended: PR-208 Board
Preparation:
- RV7/PR-208 board → fully counterclockwise
- RV8/PR-208 board → fully clockwise
- RV9/PR-208 board → fully counterclockwise
- RV10/PR-208 board → fully counterclockwise
- RV11/PR-208 board → fully counterclockwise

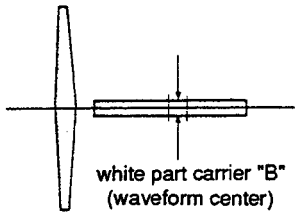
Test point: VIDEO OUT
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. Adjust the lens iris so that the video level at pin A26(GND: pin B1)/extension board is 115 ± 5 mV.



3. Put the cap on the lens.
4. Adjusting point: RV12, RV14/PR-208 Board
   Specification: A = Minimum



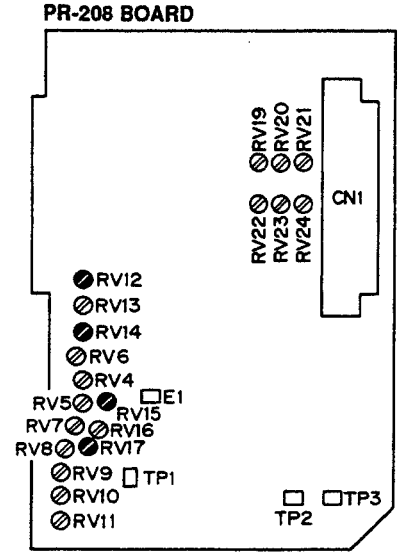
5. Remove the cap from the lens.
6. To get the following picture, set the LINE SEL switch on the waveform monitor to "15 LINES". And select the center of the monitor screen by using the VAR control of LINE SEL.
7. Adjusting point: RV15, RV17/PR-208 Board
   Specification: B = Minimum
   WFM: [for NTSC, BPF 3.58 mode]
   [for PAL, BPF 4.43 mode]



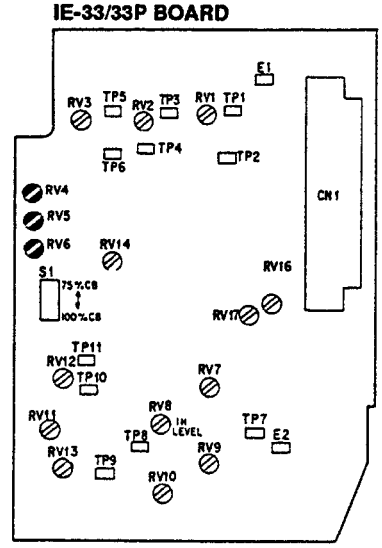
8. Repeat procedure 3 through procedure 7 several times.

Note: After the adjustment, carry out the item 8-6-6. G-CH Black Set And Pedestal Adjustment.

PR-208 BOARD



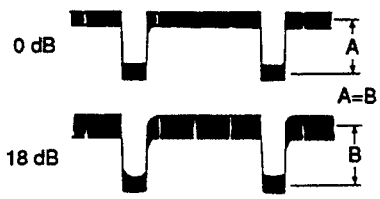
IE-33/33P BOARD



8-6-6. G-CH Black Set And Pedestal Adjustment

Note: The item 8-6-5. R-CH/B-CH Gain/Ped Adjustment must be done before this adjustment.
Make sure that 18 dB gains is set with the GAIN switch (camera side panel) set to HIGH position.

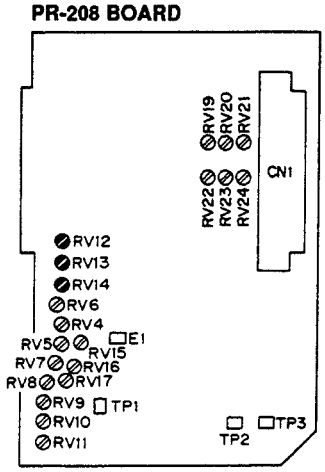
Lens iris : Close "C"
Equipment : Oscilloscope
To be extended: PR-208 Board
Preparation:
● RV7/PR-208 board → fully counterclockwise ↺
● RV8/PR-208 board → fully clockwise ↻
● RV9/PR-208 board → fully counterclockwise ↺
● RV10/PR-208 board → fully counterclockwise ↺
● RV11/PR-208 board → fully counterclockwise ↺
Trigger: pin A10/extension board
Adjustment Procedure
1. Adjust ● RV5/IE-33(33P) board so that the pedestal level does not change when the GAIN switch on the side of the camera is switched over from 0 dB to HIGH(18 dB).



2. GAIN switch/camera side panel → 0 dB
3. Test point : B21(GND: pin B1)/extension board
Adjusting point: ● RV13/PR-208 Board
Specification : [for NTSC] A = 25 ± 2 mV
[for PAL] A = 30 ± 2 mV

Note: After the adjustment, carry out the item 8-6-7. R-CH/B-CH Black Set And Pedestal Adjustment.

PR-208 BOARD

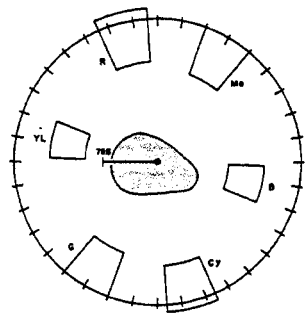


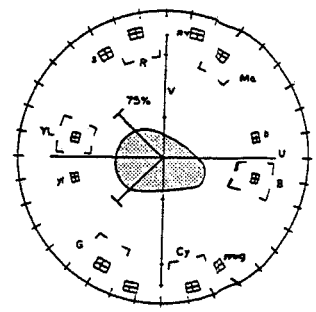
8-6-7. R-CH/B-CH Black Set And Pedestal Adjustment

Note:
- The item 8-6-6. G-CH Black Set And Pedestal Adjustment must be done before this adjustment.
- Make sure that 18 dB gains is set with the GAIN switch (camera side panel) set to HIGH position.
- Set the GAIN switch/vectorscope to MAX.

Lens iris : Close "C"
Equipment : Vectorscope
To be extended: PR-208 Board
Test point : VIDEO OUT
Adjustment Procedure
1. GAIN switch/camera side panel → HIGH(18 dB)
2. Adjust ● RV4 and ● RV6/IE-33(33P) board so that the black beam spot is in the center of the vectorscope.

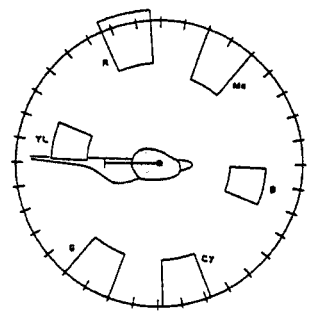
[for NTSC] **[for PAL]**

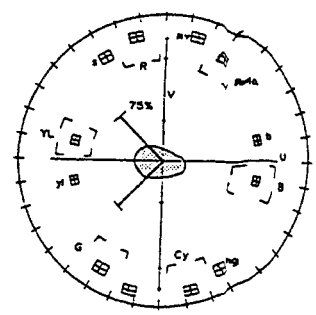




3. GAIN switch/camera side panel → 0 dB
4. Adjust ● RV12 and ● RV14/PR-208 board so that the black beam spot is in the center of the vectorscope.

[for NTSC] **[for PAL]**





5. Repeat procedure 1 through procedure 4 several times.

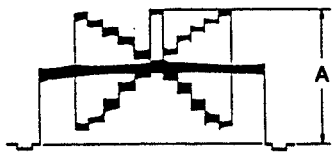
Note: After the adjustment, carry out Section 8-6-8. Knee Adjustment.

8-6-8. Knee Adjustment

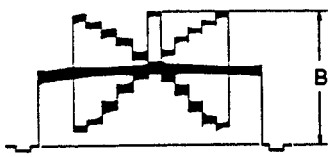
Note: The item 8-6-7. R-CH/B-CH Black Set And Pedestal Adjustment must be done before this adjustment.

Object : Grayscale chart
Equipment : Oscilloscope
To be extended: PR-208 Board
Test point : pin B21/extension board
Adjustment Procedure

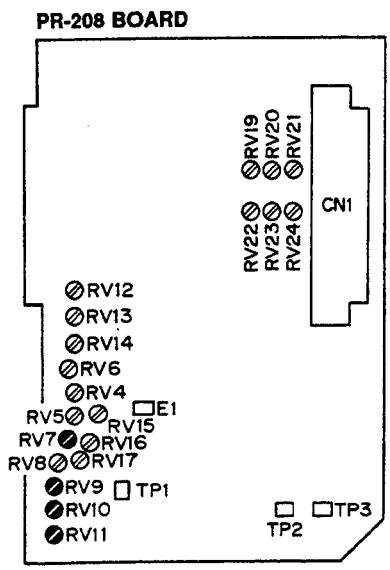
1. chart frame = underscanned monitor frame
2. Adjusting point: Lens iris
   Specification : A = 1020 $^{+10}_{-0}$ mV



3. Adjusting point: ⊘ RV7/PR-208 Board
   Specification : B = 1000 $^{+0}_{-10}$ mV



Note: After the adjustment, carry out Section 8-6-9. Pre Knee Adjustment.

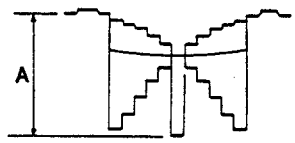


8-6-9. Pre Knee Adjustment

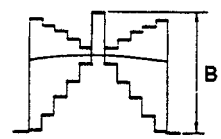
Note: The item 8-6-8. Knee Adjustment must be done before this adjustment.

Object : Grayscale chart
Equipment : Oscilloscope, Waveform monitor
To be extended: PR-208 Board
Trigger : pin A10/extension board
Adjustment Procedure

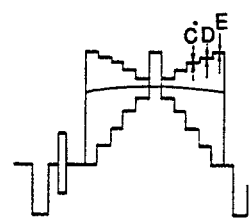
1. chart frame = underscanned monitor frame
2. Test point : pin A26(GND:pin B1)/extension board
   Adjusting point: Lens iris
   Specification : A = 350 ± 10 mV



3. Test point : pin B21(GND:pin B1)/extension board
   Adjusting point: ⊘ RV10/PR-208 Board
   Specification : B = 1150 $^{+30}_{-0}$ mV



4. Test point : VIDEO OUT
   Adjusting point: ⊘ RV9, ⊘ RV11/PR-208 Board
   Specification : Carrier leakages C, D, E → Minimum

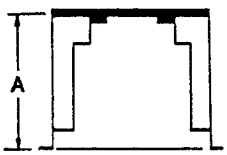


Note: After the adjustment, carry out Section 8-6-10 PR White Clip Adjustment.

8-6-10. PR White Clip Adjustment

Note: The item 8-6-9. Pre Knee Adjustment must be done before this adjustment.
Make sure that 18 dB gains is set with the GAIN switch (camera side panel) set to HIGH position.

Object : Grayscale chart
Equipment : Waveform monitor
To be extended: PR-208 Board
Preparation : GAIN switch/camera side panel → 0 dB
Test point : pin B21/extension board
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. GAIN switch/camera side panel → HIGH(18 dB)
   Adjusting point: ⊘ RV8/PR-208 Board
   Specification : A = 1150 ± 10 mV



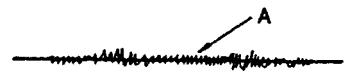
Note: After the adjustment, set switch as follows.
GAIN switch/camera side panel → 0 dB

8-6-11. Y_H Crispening Adjustment

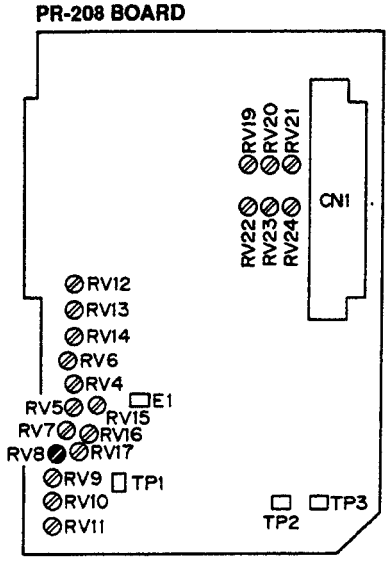
Note: When this adjustment is done, perform Section 8-6-12 Y_H Level Adjustment through Section 8-6-16 Detail Level Adjustment continuously.

Equipment : Oscilloscope
To be extended: ES-7 board
Preparation:
- Lens iris → Close "C"

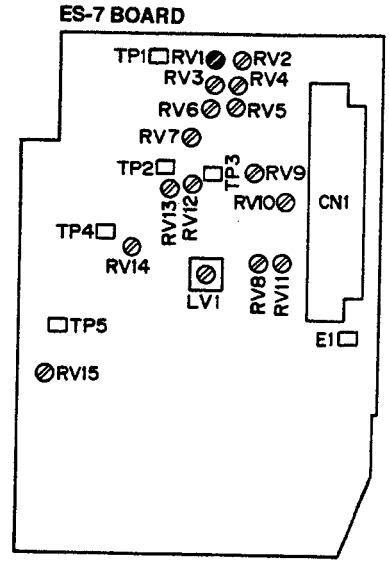
⊘ RV4/PR-208 board → Fully clockwise ↻
Test point: TP1(GND:E1)/ES-7 board
Adjustment Procedure
Turn ⊘ RV1/ES-7 board clockwise slowly from the leftmost position and stop where just before the noise "A" on the black areas of the waveforms starts to be reduced.



PR-208 BOARD



ES-7 BOARD

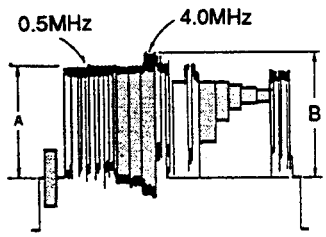


8-6-12. YH Level Adjustment

Note: Section 8-6-11 YH Crispening Adjustment must be complete before beginning this adjustment.

Object :Burst chart
Equipment :Waveform monitor
To be extended: ES-7 Board
Preparation :● RV4/PR-208 board → Fully clockwise ↺
Test point :VIDEO OUT
Adjustment Procedure

1. chart frame = underscanned monitor frame
2. Adjusting point: Lens iris
   Specification: [for NTSC] A=80 ± 2 IRE (0.5 MHz LEVEL)
   [for PAL] A=560 ± 10 mV(0.5 MHz LEVEL)
   (To get the following picture, set the LINE SEL switch on the waveform monitor to "15 LINES". And select the center of the monitor screen by using the VAR control of LINE SEL.)



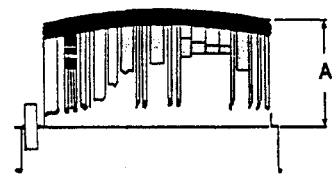
3. Adjusting point: ● RV2/ES-7 Board
   Specification :[for NTSC] B=85 ± 3 IRE (4.0 MHz LEVEL)
   [for PAL] B=595 ± 15 mV(4.0 MHz LEVEL)

8-6-13. YH Aliasing Adjustment

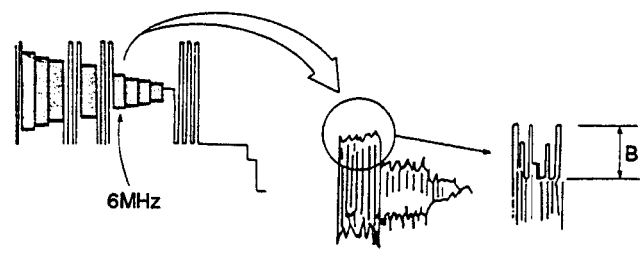
Note: Section 8-6-12 YH Level Adjustment must be complete before beginning this adjustment.

Object :Burst chart
Equipment: Waveform monitor
Test point :VIDEO OUT
Adjustment Procedure

1. chart frame = underscanned monitor frame
2. Adjusting point: Lens iris
   Specification :[for NTSC] A = 80 ± 2 IRE
   [for PAL] A = 560 ± 10 mV

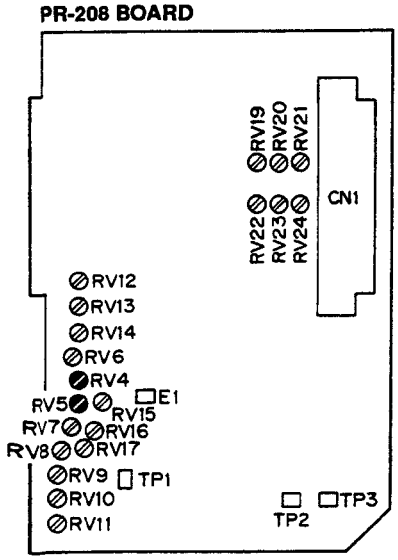


3. Adjusting point: ● RV13/IE-33(33P) Board
   Specification :B = Minimum
   (To get the following picture, set the LINE SEL switch on the waveform monitor to "15 LINES". And select the center of the monitor screen by using the VAR control of LINE SEL.)

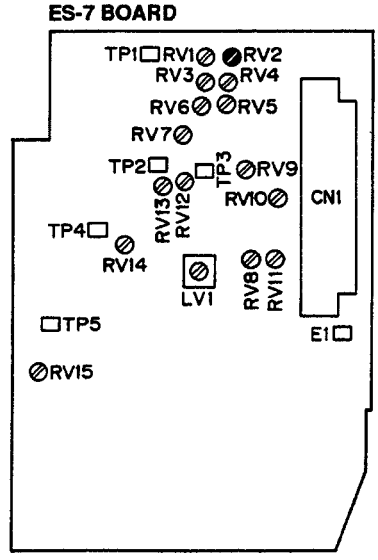


Note: After the adjustment, carry out Section 8-6-14. DTL Crispening/Aliasing Adjustment.

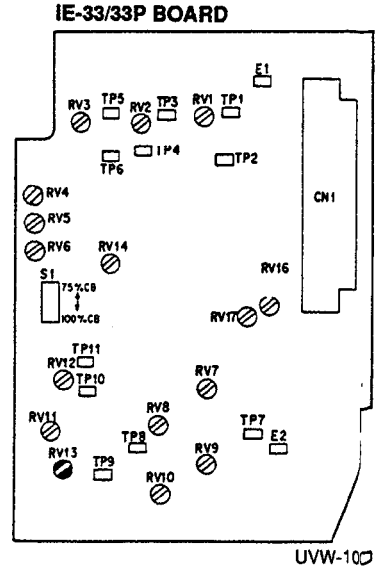
PR-208 BOARD



ES-7 BOARD



IE-33/33P BOARD

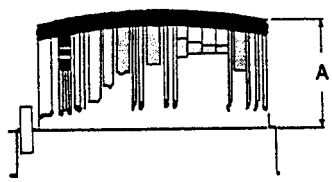


UVW-10□ (UC)
UVW-10□P (EK)

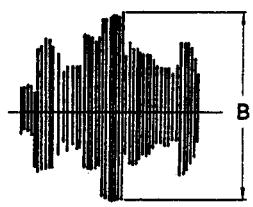
8-6-14. DTL Crispening/Aliasing Adjustment

Note: Section 8-6-13. Y_H Aliasing Adjustment must be complete before beginning this adjustment.

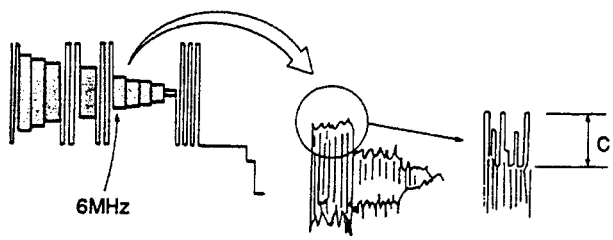
Object :Burst chart
Equipment :Oscilloscope, Waveform monitor
To be extended: PR-208 Board
Preparation :● RV5/PR-208 board→ Fully clockwise ↺
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. Test point :VIDEO OUT
   Adjusting point: Lens iris
   Specification :[for NTSC] A=80 ± 3 IRE
   [for PAL] A=560 ± 15 mV



3. Test point :pin B15(GND:pin B1)/extension board
   Adjusting point: ● RV4/PR-208 Board
   Specification :B = 250 ± 10 mV



3. To get the following picture, set the LINE SEL switch on the waveform monitor to "15 LINES". And select the center of the monitor screen by using the VAR control of LINE SEL.
   Adjusting point: ● RV11/IE-33(33P) Board
   Specification :C = Minimum

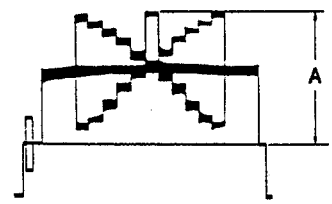


Note: After the adjustment, carry out Section 8-6-15. H/V Ratio Adjustment.

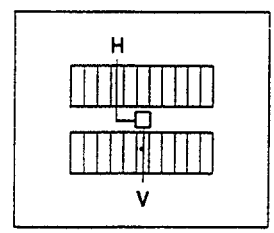
8-6-15. H/V Ratio Adjustment

Note: Section 8-6-14. DTL Crispening/Aliasing Adjustment must be complete before beginning this adjustment.

Object :Grayscale chart
Equipment :B/W monitor screen
Preparation :
WHITE BAL switch/camera side panel → PRESET
Test point :VIDEO OUT
Adjusting point: ● RV12/IE-33(33P) Board
Adjustment Procedure
1. chart frame = underscanned monitor frame
2. Adjusting point: Lens iris
   Specification :[for NTSC] A=80 ± 2 IRE
   [for PAL] A=560 ± 10 mV

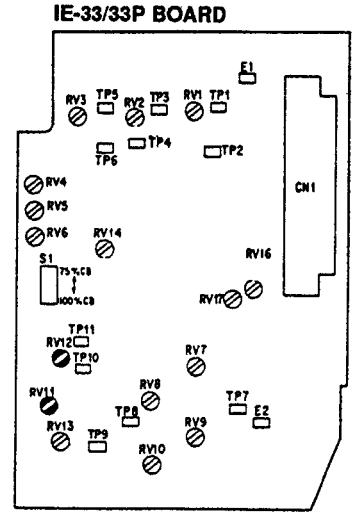


3. Observing the indicated point on the B/W monitor (See the figure below), adjust ● RV12/IE-33(33P) board so that the DTL H and V are balanced.



Note: After the adjustment, carry out Section 8-6-16. DETAIL ADJUSTMENT.

IE-33/33P BOARD

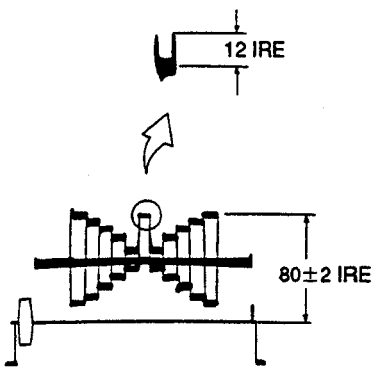


8-6-16. Detail Level Adjustment

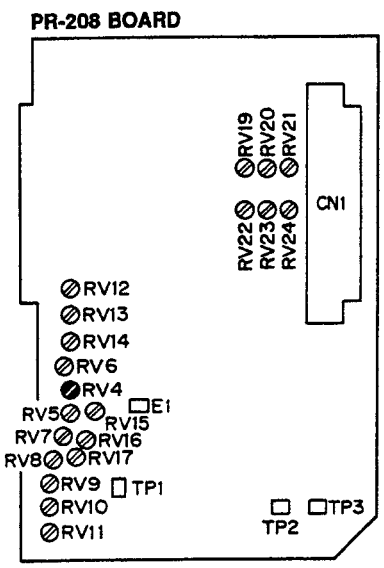
Note: Section 8-6-15. H/V Ratio Adjustment must be complete before beginning this adjustment.

Object : Grayscale chart
Equipment : Waveform monitor
Preparation:
WHITE BAL switch/camera side panel → PRESET
Test point : VIDEO OUT
Adjusting point: ⊘ RV4/PR-208 Board
Adjustment Procedure

1. chart frame = underscanned monitor frame
2. Adjust the lens iris so that the video level at VIDEO OUT is 80 ± 2 IRE(for NTSC) or 560 ± 10 mV(for PAL).
3. Adjust ⊘ RV4/PR-208 board so that the detail level at both ends of the white level is 12 ± 2 IRE(for NTSC) or 80 ± 10 mV(for PAL). (Note: If the two DTL levels are not balanced, take the higher one.)



4. Repeat the item 8-6-15. H/V Ratio Adjustment and 8-6-16. Detail Level Adjustment several times.



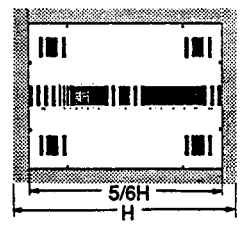
8-6-17. ES White Clip Adjustment

Object : Burst chart
Equipment : Waveform monitor
To be extended: ES-7 Board
Test point : VIDEO OUT
Preparation:

- WHITE BAL switch/camera side panel → PRESET
- GAIN switch/camera side panel → 0dB

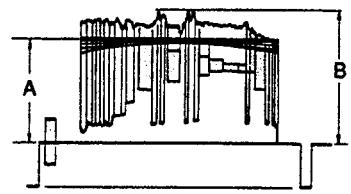
Adjustment Procedure

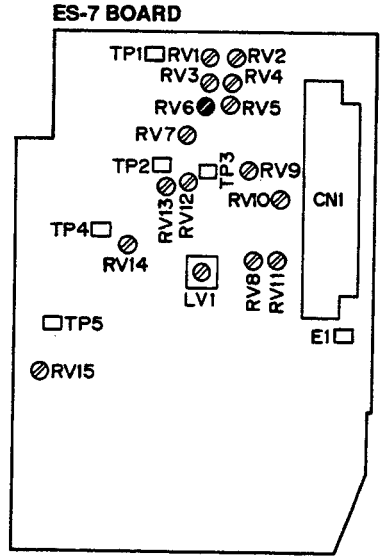
1. Make sure that the lens is best focused. And adjust the zoom control of the lens so that the chart frame touches the underscanned monitor frame.



(monitor screen)

2. Adjusting point: Lens iris
   Specification : [for NTSC] A=110 ± 2 IRE
   [for PAL] A=770 ± 10 mV
3. Adjusting point: ⊘ RV6/ES-7 Board
   Specification : [for NTSC] B=125 $^{+0}_{-2}$ IRE(the highest level)
   [for PAL] B=870 $^{+0}_{-10}$ mV(the highest level)

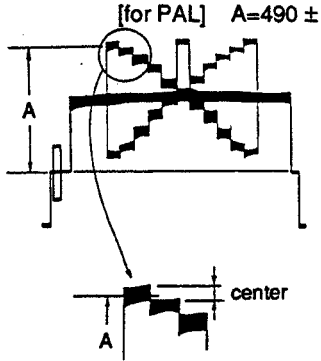




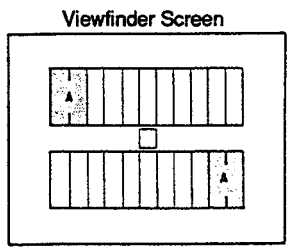
8-6-18. Zebra Level Adjustment

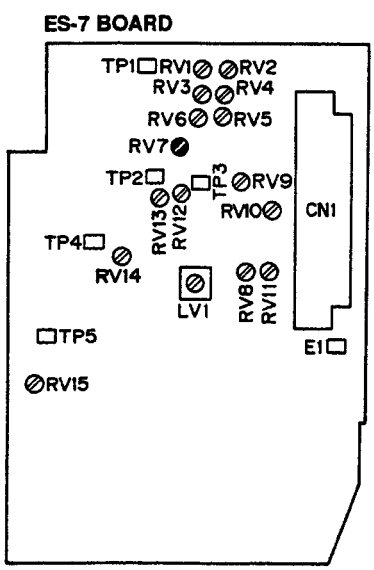
Object : Grayscale chart
Equipment : Viewfinder screen
To be extended: ES-7 Board
Preparation : OUTPUT switch/camera side panel → CAM
Adjusting point : ⊘ RV7/ES-7 Board
Adjustment Procedure

1. chart frame = underscanned monitor frame
2. Adjusting point: Lens iris
   Specification : [for NTSC] A=70 ± 2 IRE
   [for PAL] A=490 ± 10 mV



3. Adjust ⊘ RV7/ES-7 board so that the stripped pattern appears in the portion A of the VF screen as shown below.

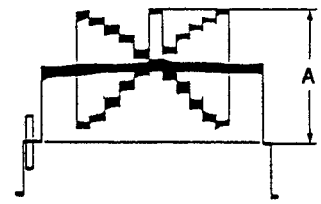




8-6-19. Auto Iris Adjustment

Object : Grayscale chart
Equipment: Viewfinder screen
Adjustment Procedure

1. chart frame = underscanned monitor frame
2. IRIS AUTO/MANU(LENS) → MANU
3. POWER switch/camera side panel → OFF
4. S2(FULL FUNC ↔ OPE)/AT-85 board → FULL FUNC(Under side)
   S4(ADJ/OPE)/AT-85 board → OPE(Upper side)
5. Turn the POWER switch/camera side panel ON while pressing both UP button and DOWN button on the front panel.
6. Adjust the lens iris so that the VIDEO OUT level "A" is 100 ± 1 IRE(for NTSC) or 700 ± 5 mV(for PAL).



7. Press the UP button on the front panel only once for memorizing the auto iris level.

Note: After the adjustment, set S2(FULL FUNC ↔ OPE) /AT-85 board to "OPE"(Upper side) position.

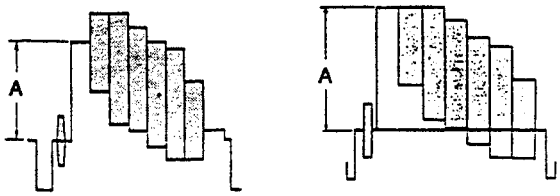
8-7. INTERFACE SYSTEM ADJUSTMENT

8-7-1. Rear Video Out Level Adjustment

Note: Make sure that EXT VTR connector on the rear panel are not connected with any cable.

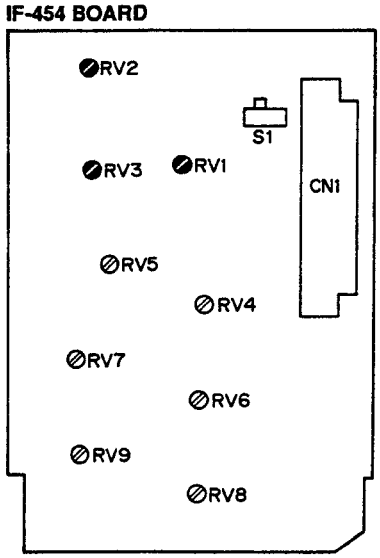
Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A5(GND: A6)/extension board
Adjusting point: ⊘ RV1/IF-454 board
Specification : A = 1670 ± 40 mVp-p [for NTSC]
A = 2000 ± 40 mVp-p [for PAL]

[for NTSC] **[for PAL]**



Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

IF-454 BOARD

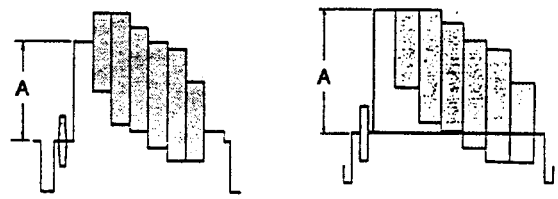


8-7-2. CCZ VBS/Y Out Level Adjustment

Note: Make sure that EXT VTR connector on the rear panel are not connected with any cable.

Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A25(GND: A24)/extension board
Adjusting point: ⊘ RV2/IF-454 board
Specification : A = 1670 ± 40 mVp-p [for NTSC]
A = 2000 ± 40 mVp-p [for PAL]

[for NTSC] **[for PAL]**

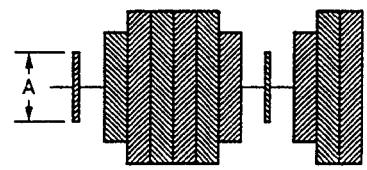


Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

8-7-3. CCZ CF/C Out Level Adjustment

Note: Make sure that EXT VTR connector on the rear panel are not connected with any cable.

Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A23(GND: A22)/extension board
Adjusting point : ⊘ RV3/IF-454 board
Specification : A = 570 ± 10 mV [for NTSC]
A = 600 ± 10 mV [for PAL]



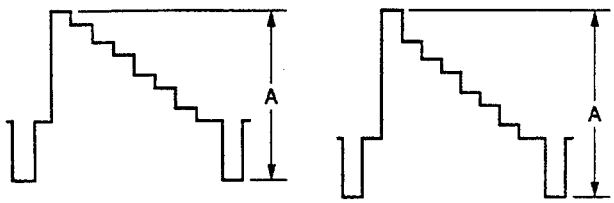
Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

8-7-4. CCZ Y Level Adjustment

Note: Make sure that EXT VTR connector on the rear panel are not connected with any cable.

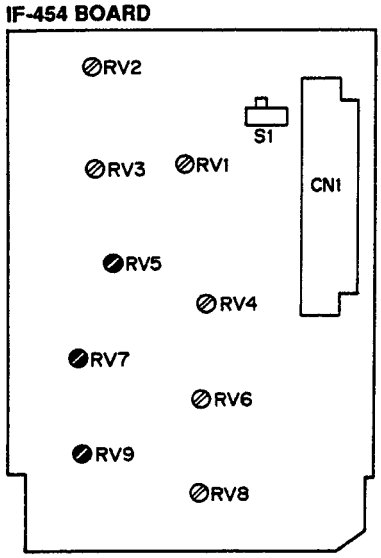
Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A21(GND: A4)/extension board
Adjusting point : ⊘ RV5/IF-454 board
Specification : A = 1670 ± 40 mVp-p [for NTSC]
A = 2000 ± 40 mVp-p [for PAL]

[for NTSC] **[for PAL]**



Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

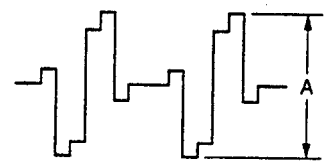
IF-454 BOARD



8-7-5. CCZ R-Y Level Adjustment

Note: Make sure that EXT VTR connector on the rear panel are not connected with any cable.

Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A19(GND: A18)/extension board
Adjusting point : ⊘ RV7/IF-454 board
Specification : A = 1400 ± 40 mVp-p [for NTSC]
A = 1050 ± 40 mVp-p [for PAL]

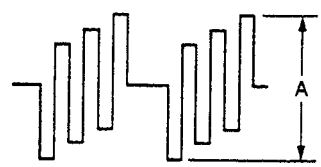


Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

8-7-6. CCZ B-Y Level Adjustment

Note: Make sure that EXT.VTR connector on the rear panel are not connected with any cable.

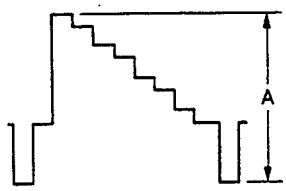
Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A17(GND: A16)/extension board
Adjusting point : ⊘ RV9/IF-454 board
Specification : A = 1400 ± 40 mVp-p [for NTSC]
A = 1050 ± 40 mVp-p [for PAL]



Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

8-7-7. VTR Y Level Adjustment

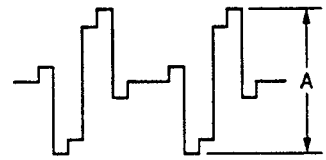
Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A13(GND: A4)/extension board
Adjusting point : ⊘ RV4/IF-454 board
Specification : A = 835 ± 40 mVp-p [for NTSC]
A = 1000 ± 40 mVp-p [for PAL]



Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

8-7-8. VTR R-Y Level Adjustment

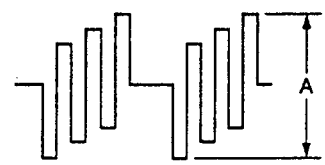
Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A11(GND: A4)/extension board
Adjusting point : ⊘ RV6/IF-454 board
Specification : A = 700 ± 20 mVp-p [for NTSC]
A = 525 ± 20 mVp-p [for PAL]



Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

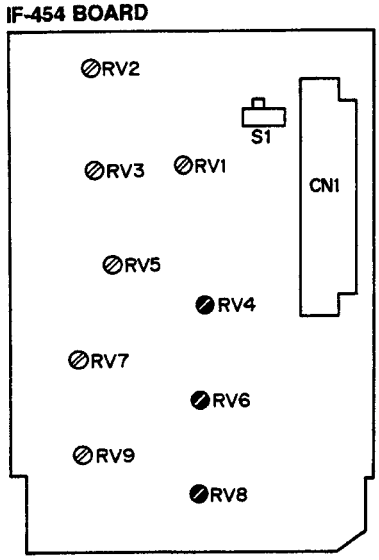
8-7-9. VTR B-Y Level Adjustment

Equipment : Oscilloscope
To be extended: IF-454 board
Preparation:
OUTPUT switch/camera side panel → BARS
VTR SELECT switch/camera side panel → 2
S1 switch/IF-454 board → ON
Test point : pin A9(GND: A4)r/extension board
Adjusting point : ⊘ RV8/IF-454 board
Specification : A = 700 ± 20 mVp-p [for NTSC]
A = 525 ± 20 mVp-p [for PAL]



Note: After the adjustment, set the switch as follows.
S1 switch/IF-454 board → NORM

IF-454 BOARD



SECTION 9
VTR ALIGNMENT

9-1. PREPARATION

9-1-1. Equipment Required

for NTSC

- Oscilloscope (Tektronix 2445B/200 MHz or equivalent)
- Digital Voltmeter (Advantest TR6845 or equivalent)
- Frequency Counter (Advantest TR5821 or equivalent)
- Audio Signal Generator (HP8904 or equivalent)
- Audio Level Meter (HP3400A or equivalent)
- Component Waveform Monitor (Tektronix WFM300 /WFM300A or equivalent)
- Component Signal Generator (Tektronix TSG300 or equivalent)
- Sweep Generator (Shibasoku VS-12CX or equivalent)
- Spectrum Analyzer (Advantest R4131 B/D or equivalent)
- Deviation Checker EW-579 (Sony part No.; J-6335-790-A)
  If you have a spectrum analyzer, a deviation checker is not necessary.
- Input Tools (Refer to page 9-4.)
- Standard Playback Unit (SONY PVW-2600 or equivalent)
- DC Power Supply (SONY AC-500/550 or CMA-8/8A)
- Blank Tape (SONY BCT-20MA or equivalent)
- Alignment Tapes CR5-1B (Sony part No.; 8-960-096-41)
  CR8-1A (Sony part No.; 8-960-097-45)

Alignment tape contents

CR8-1A (Sony part No.; 8-960-097-45)

TIME min. sec	AUDIO TRACK	VIDEO TRACK	CTL TRACK
0: 00	1 kHz, 0 VU *1	—	CTL
2: 55	Blank		
3: 00	10 kHz, -10 VU	—	CTL
4: 55	Blank		
5: 00	1 kHz, -20 VU	—	CTL
5: 55	Blank		
6: 00	40 Hz, -20 VU *2	—	CTL
6: 25	Blank		
6: 30	7 kHz, -20 VU *2	—	CTL
6: 55	Blank		
7: 00	10 kHz, -20 VU *2	—	CTL
7: 25	Blank		
7: 30	15 kHz, -20 VU *2	—	CTL
7: 55	Blank		
8: 00			
10: 00	1 kHz, 0 VU	—	1 kHz, 0 VU

Note:

*1. When the tape is played back to check or adjust the audio reference level, the output level (+4 dB) should be calibrated in accordance with the value described below.

Example) Calibration level = –0.5 dB
Output level = +4 dB –0.5 dB = +3.5 dB

*2. When the tape is played back to check or adjust the audio frequency responce, the output level should be calibrated with the calibration value.

CR5-1B (Sony part No.; 8-960-096-41)

TIME min. sec	VIDEO TRACK	AFM
0: 00	RF Sweep	No-Signal
2: 00	60% H Sweep (CTDM)	
5: 00	Pulse & Bar (CTDM)	
8: 00	Multi Burst	
11: 00	Pulse & Bar	
14: 00	75% Color Bars	400 Hz SINE WAVE 25 kHz DEVIATION
16: 30		75 kHz DEVIATION
17: 00	50% Bowtie & 12.5T	No-Signal
19: 00	Line 17 signal	
22: 00	Quad Phase	
24: 00	Flat Field	
26: 00	75% Color Bars with Dropout	
28: 00	Composite V Sweep with VISC	
30: 00		

for PAL

- Oscilloscope (Tektronix 2445B/200 MHz or equivalent)
- Digital Voltmeter (Advantest TR6845 or equivalent)
- Frequency Counter (Advantest TR5821 or equivalent)
- Audio Signal Generator (HP8904 or equivalent)
- Audio Level Meter (HP3400A or equivalent)
- Component Waveform Monitor (Tektronix WFM300 /WFM300A or equivalent)
- Component Signal Generator (Tektronix TSG300 or equivalent)
- Sweep Generator (Shibasoku VS-12CX or equivalent)
- Spectrum Analyzer (Advantest R4131 B/D or equivalent)
- Deviation Checker EW-580 (Sony part No.; J-6335-800-A)
  If you have a spectrum analyzer, a deviation checker is not necessary.
- Input Tools (Refer to page 9-4.)
- Standard Playback Unit (SONY PVW-2600P or equivalent)
- DC Power Supply (SONY AC-500CE/550CE or CMA-8CE/8ACE)
- Blank Tape (SONY BCT-20MA or equivalent)
- Alignment Tapes CR5-1B PS (Sony part No.; 8-960-096-91)
  CR8-1B PS (Sony part No.; 8-960-096-86)

Alignment tape contents

CR8-1B PS (Sony part No.; 8-960-096-86)

TIME min. sec	AUDIO TRACK
0: 00	1 kHz/0 VU *1
3: 00	15 kHz/0 VU
5: 00	1 kHz/-20 VU
6: 00	40 Hz/-20 VU *2
6: 30	7 kHz/-20 VU *2
7: 00	10 kHz/-20 VU *2
7: 30	15 kHz/-20 VU *2
8: 00	

CR5-1B PS (Sony part No.; 8-960-096-91)

TIME min. sec	VIDEO TRACK	AFM
0: 00	RF Sweep Marker 1, 2, 4, 6, 8, 10, 12 MHz	No-Signal
2: 00	60% H-Sweep (CTDM) Marker 0.5, 1, 2, 3, 4, 5 MHz	
5: 00	Pulse & Bar (CTDM)	
8: 00	60 % Multi Burst Y : 0.5, 1, 2, 4, 5, 5.5 MHz C : 0.2, 0.5, 1, 1.5, 2 MHz	
11: 00	Pulse & Bar	
14: 00		400 Hz Sine Wave 25 kHz Deviation
16: 30	100% Color Bars	75 kHz Deviation
17: 00	50% Bowtie & 10T	No-Signal
19: 00	Line 17A signal	
22: 00	Quad Phase	
24: 00	50% Flat Field	
26: 00	100% Color Bars with Dropout	
28: 00	Composite H-Sweep with VISC	
30: 00		

Note:

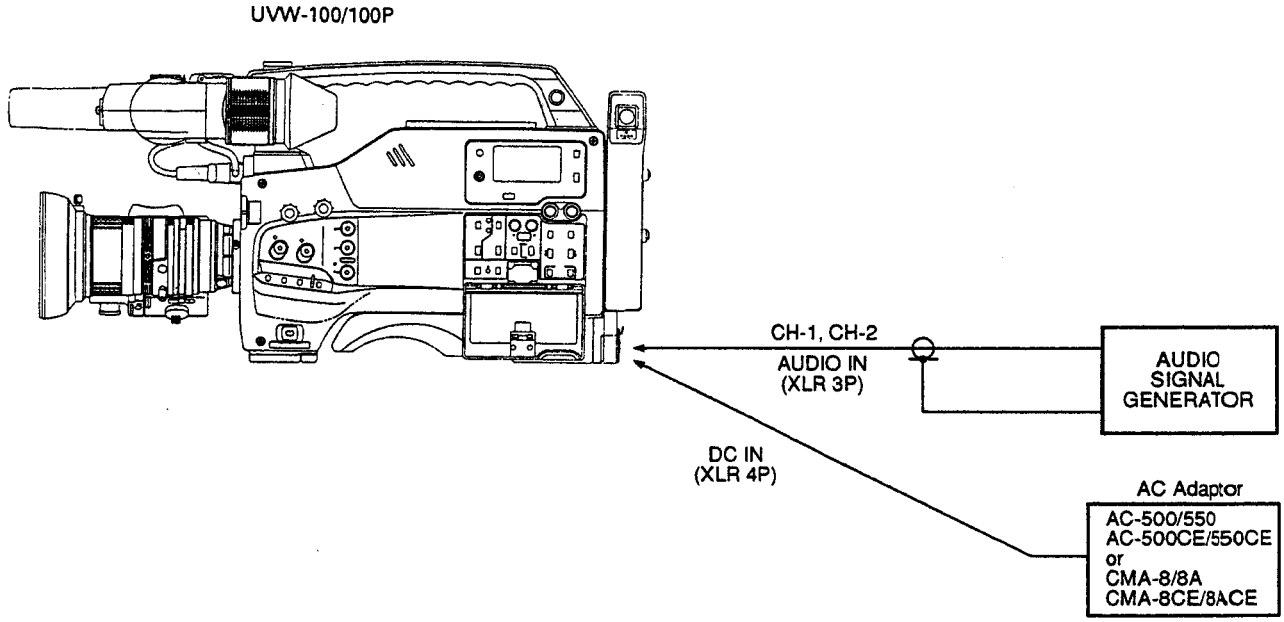
*1. When the tape is played back to check or adjust the audio reference level, the output level (+4 dB) should be calibrated in accordance with the value described below.

Example) Calibration level = –0.5 dB
Output level = +4 dB –0.5 dB = +3.5 dB

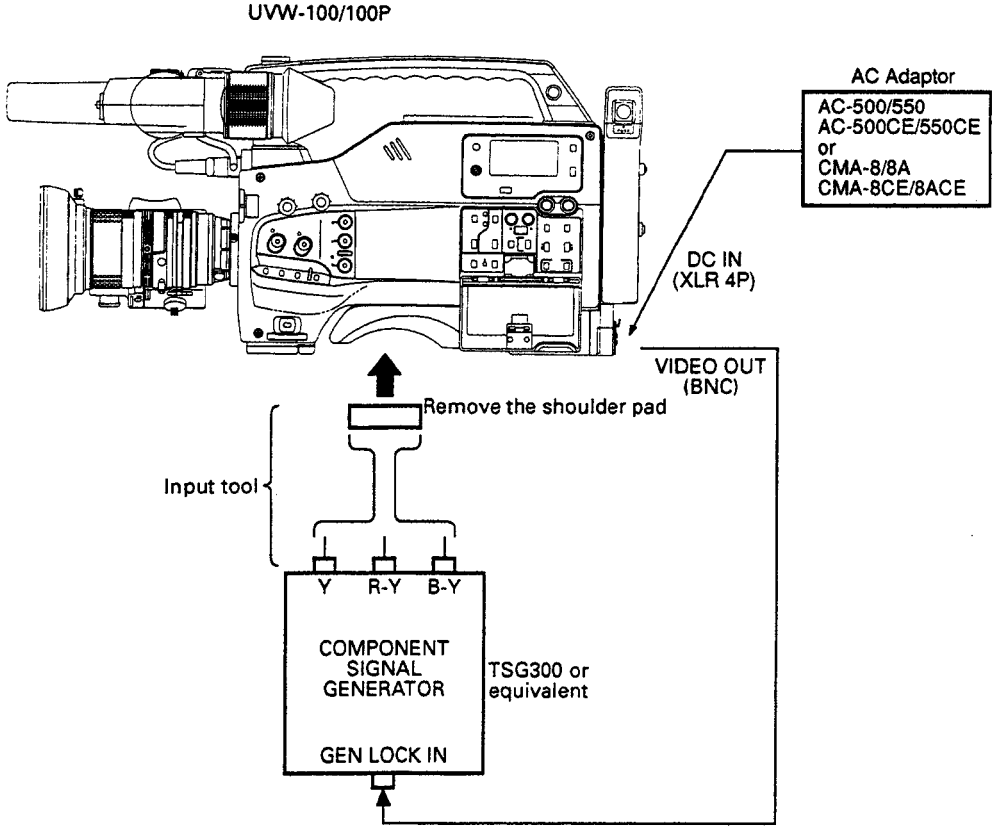
*2. When the tape is played back to check or adjust the audio frequency responce, the output level should be calibrated with the calibration value.

9-1-2. Connection

CONNECTION 1.(Audio, Video alignment)



CONNECTION 2.(Video alignment)

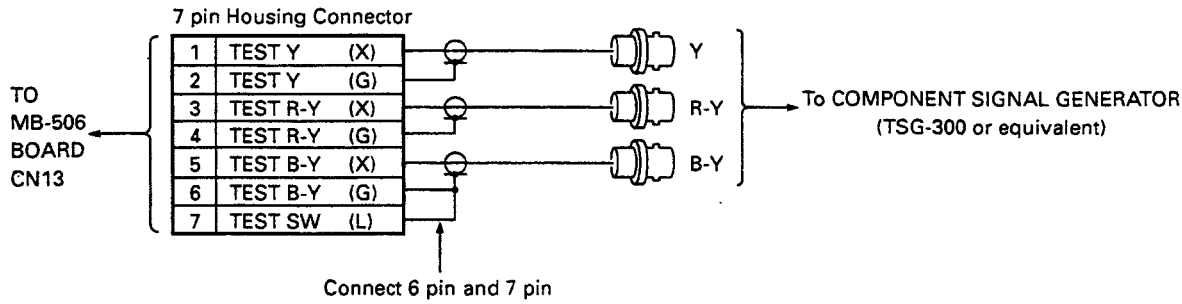


9-1-3. How To Make Input Tool

Preparation: HOUSING 7P (Sony part No.; 1-569-200-11)
CONTACT, FEMALE, AWG24-30 (Sony part No.; 1-569-193-11)
BNC connector (Sony part No.; 1-560-069-11)
CONNECTION CABLE

Making the tools:

1. Cut the cable integument with a cutter.
2. Strip the cover of the shield wire with a nipper.
3. Solder the connection cable and 1pin-2pin, 3pin-4pin and 5pin-6pin of the housing connector.
4. Connect the connection cable to 6pin and 7pin of the housing connector.
5. Solder the connection cable and BNC terminals.
6. Be sure to check the continuity with a tester.



9-1-4. Switch Setting before Adjustment

Display
- MARKER switch : OFF
- LIGHT switch : ON

Audio Functions
- MONITOR SELECT switch : MIX
- AUDIO LEVEL knobs : Fully clockwise
- AUDIO SELECT switches : AUTO
- AUDIO IN switches : LINE
- +48 V switches : OFF
- FRONT MIC LOW CUT switch : OFF
- MONITOR knob : MAX

Shooting and Recording/Playback Functions
- PHASE switch : 0°
- EXT VTR OUTPUT switch : 1
- VTR TRIGGER switch : INT ONLY
- ZEBRA button : OFF
- OUTPUT switch : BARS
- GAIN switch : 0 dB

Time Code Functions
- DISPLAY switch : CTL
- TC mode switch 2 : R-RUN
- TC mode switch 1 : PRESET

Switches on the Board
- S1/IE-33 board : 75 %
- S550/TC-86 (86A) board : MENU
- S700/VO-46 (46A) board : S700

Note: Do not touch the switches and knobs as mentioned above without particular indication.

9-1-5. Preparation before Adjustment and Notes on Adjustment

[Preparation before Adjustment]

Cleaning of stationary heads

Clean stationary heads by the cleaning piece moistened with cleaning fluid.
After the fluid vaporizes, wipe off the heads by a not-weaved cloth or cleaning piece.

[Notes on Adjustment]

- Blank tape means a cassette tape on which no video/audio signals are recorded.
- When an alignment tape(CR8-1A or CR8-1B PS) is played back, specification should be corrected according to the correction value mentioned in the tape level.
- The alignment tape is used within the limits about 50 times and recommend to manage by marking.
- Standard playback unit should be the unit which audio head phase, playback frequency response, playback level adjustments.
  And also adjusted with playback video phase, playback Y/C delay and playback C/C delay adjustments are performed.
- 0 dBu = 0.775 Vrms

9-1-6. Adjustment Item

9-2. POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT
- 9-2-1. OSC Frequency Adjustment
- 9-2-2. Clock Frequency Adjustment

9-3. SERVO ALIGNMENT
- 9-3-1. Capstan Free Speed Adjustment
- 9-3-2. Stop Servo Adjustment

9-4. AUDIO ALIGNMENT
- 9-4-1. Audio Level Volume Reference Position Adjustment
- 9-4-2. Limiter Level Adjustment
- 9-4-3. Meter Level Adjustment
- 9-4-4. Playback Frequency Response Adjustment
- 9-4-5. Playback Reference Level Adjustmnet
- 9-4-6. Bias Trap Adjusmtent
- 9-4-7. Bias Current Adjustment
- 9-4-8. Overall Recording Level Adjustment
- 9-4-9. Overall Dolby Frequency Response Adjustment
- 9-4-10. Overall Channel Phase Adjustment

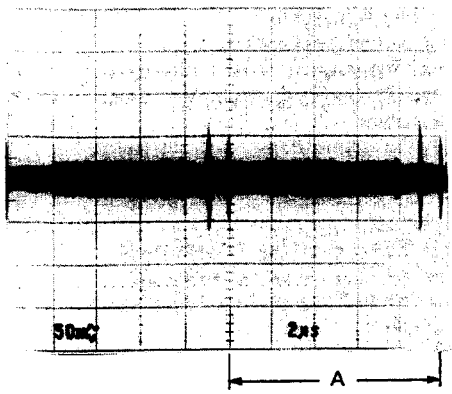
9-5 . VIDEO ALIGNMENT
- 9-5-1. PLL VCO Error Voltage Adjustment
- 9-5-2. Y Input Level Adjustment
- 9-5-3. Y REF SYNC Position Adjustment
- 9-5-4. SLEW RATE Limiter Adjustment
- 9-5-5. Y Nonlinear Pre-emphasis Mix Level Adjustment
- 9-5-6. Y REC HF Adjustment
- 9-5-7. Y Carrier/Deviation Adjustment (Using a Spectrum analyzer)
  Y Carrier/Deviation Adjustment (Using a Deviation checker)
- 9-5-8. Y Recording Current Frequency Response Adjustment
- 9-5-9. Y Recording Current Level Adjustment
- 9-5-10. R-Y, B-Y A/D Clamp Voltage Adjustment
- 9-5-11. R-Y, B-Y A/D Input Level Adjustment
- 9-5-12. C/C Delay Tentative Adjustment
- 9-5-13. CTDM Level Adjustment
- 9-5-14. C REF SYNC Position Tentative Adjustment
- 9-5-15. C Nonlinear Pre-emphasis Mix Level Adjustment
- 9-5-16. C REC HF Adjustment
- 9-5-17. C Carrier/Deviation Adjustment (Using a Spectrum Analyzer)
  C Carrier/ Deviation Adjustment (Using a Deviation checker)
- 9-5-18. C Recording Current Frequency Response Adjustment
- 9-5-19. C Recording Current Level Adjustment
- 9-5-20. Y RF Level Adjustment
- 9-5-21. C RF Level Adjustment
- 9-5-22. RF Alarm Adjustment
- 9-5-23. Overall Y Recording Frequency Response Check
- 9-5-24. Overall C Recording Frequency Response Check
- 9-5-25. Recording Y/C Delay Adjustment
- 9-5-26. Recording C/C Delay Adjustment

9-2. POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT

9-2-1. OSC Frequency Adjustment

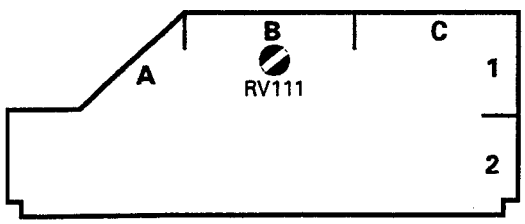
Equipment: Oscilloscope
Preparation:
- Input signal: No signal
- EE mode

Test point: Pin5 of CN2/VO-46 (46A) Board
GND:E450
Trigger: INT
Adjusting point: RV111/DC-63 Board
Specification: A = 10.4 ± 0.2 µs

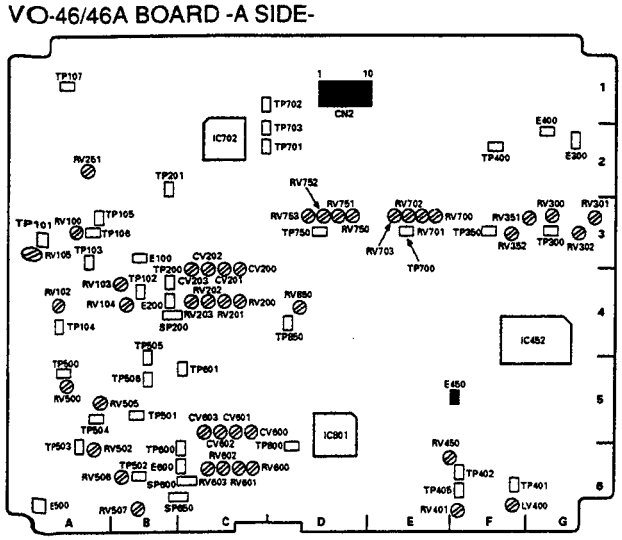


Note: Band width limit of oscilloscope
20 MHz BW LIMIT: OFF

DC-63 BOARD -A SIDE-



VO-46/46A BOARD -A SIDE-

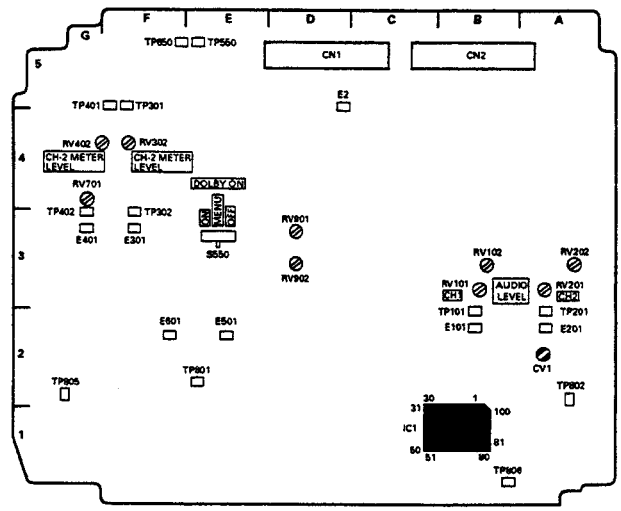


9-2-2. Clock Frequency Adjustment

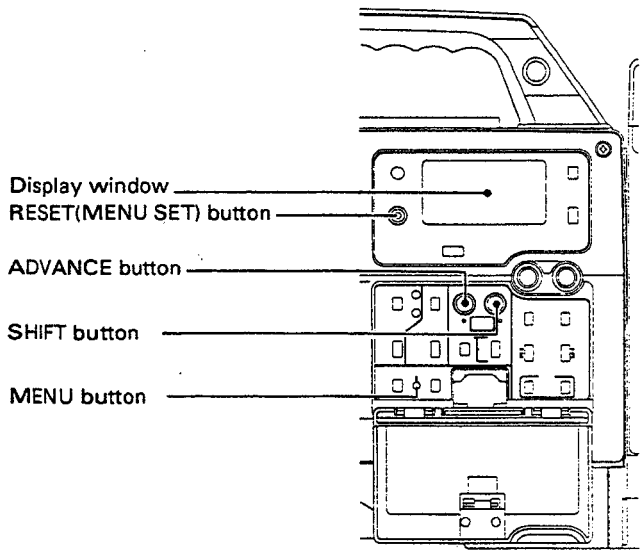
Equipment: Frequency Counter
Preparation:
- Input signal: No signal
- EE mode

Test point: Pin11 of IC1/TC-86 (86A) Board
Adjusting point: CV1/TC-86 (86A) Board
Specification: 512.000 ± 0.001 Hz

TC-86/86A BOARD -A SIDE-



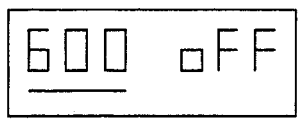
9-3. SERVO ALIGNMENT



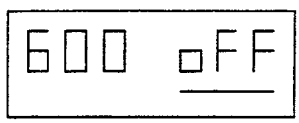
9-3-1. Capstan Free Speed Adjustment

Adjustment procedure

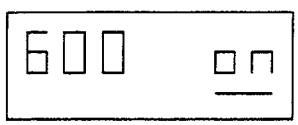
1. Confirm that no tape is inside the unit.
2. Enter maintenance menu, and select the menu number 601.
   (1)While pressing the SHIFT button, press the MENU button. And then remove a hand from the SHIFT button and keep pressing the MENU button more than 1 second.
   Indication in the display window
   (In the following description, an underscore indicates a portion of the display which is blinking.)



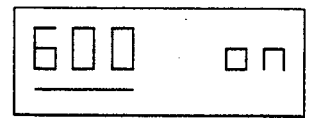
   (2)Press the RESET(MENU SET) button once, then "OFF" is blinking.
   Indication in the display window



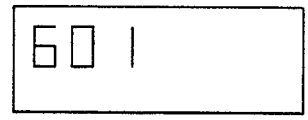
   Whenever pressing the RESET(MENU SET) button, "600" and "OFF" is blinking alternately.
   (3)Press the ADVANCE button once, then select "ON"
   Indication in the display window



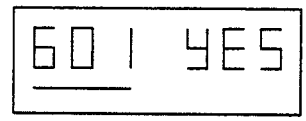
   Whenever pressing the ADVANCE button, "ON" and "OFF" is set alternately.
   (4)Press the RESET(MENU SET) button once.
   Indication in the display window



   Whenever pressing the RESET(MENU SET) button, "600" and "ON" is blinking alternately.
   (5) Press the ADVANCE button once, then menu number 601 is indicated.
   Indication in the display window



   Whenever pressing the ADVANCE button, indication cycles through the following menu number.
   600→ 601→ 602→ .... → 509→ 600→ 601→ ....
   Whenever pressing the SHIFT button, indication cycles through the following menu number.
   600→ 509→ 508→ .... → 601→ 600→ 509→ ....
3. Press the RESET(MENU SET) button.
4. After confirmed the capstan turns, wait for a while.(max. 60 sec.)
5. Confirm the following indication in the display window.



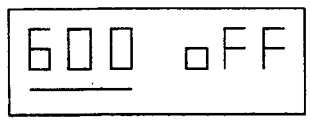
   If the following figure is displayed, exit the menu number 601 once. And perform procedure 2 and later. When the menu has no change, check the unit error.

6. Press the MENU button to exit the maintenance menu.
   The display window returns to the state before entering the maintenance menu.

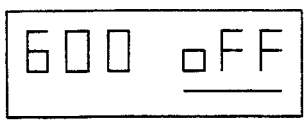
9-3-2. Stop Servo Adjustment

Adjustment procedure:

1. Insert a blank tape (BCT-20MA) into the unit.
2. Enter maintenence menu, and select the menu number 602.
   (1)While pressing the SHIFT button, press the MENU button. And then remove a hand from the SHIFT button and keep pressing the MENU button more than 1 second.
   Indication in the display window.
   (In the following description, an underscore indicates a portion of the display which is blinking.)

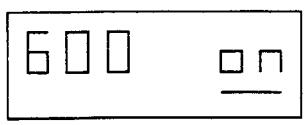


   (2)Press the RESET(MENU SET) button once, then "OFF" is blinking.
   Indication in the display window



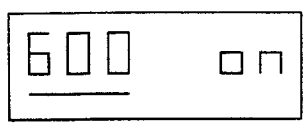
   Whenever pressing the RESET(MENU SET) button, "600" and "OFF" is blinking alternately.

   (3)Press the ADVANCE button once, then select "ON".
   Indication in the display window

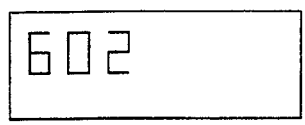


   Whenever pressing the ADVANCE button, "ON" and "OFF" is set alternately.

   (4)Press the RESET(MENU SET) button once.
   Indication in the display window



   Whenever pressing the RESET(MENU SET) button, "600" and "ON" is blinking alternately.
   (5)Press the ADVANCE button twice, then menu number 602 is indicated.
   Indication in the display window



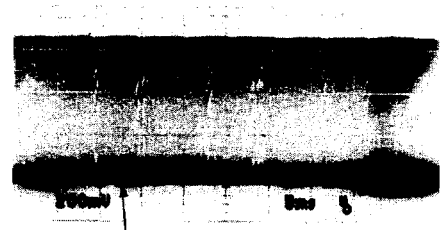
   Pressing the ADVANCE button cycles through the following menu number.
   600→ 601→ 602→ .... → 509→ 600→ 601→ ....
   Pressing the SHIFT button cycles through the following menu number.
   600→ 509→ 508→ ....→ 601→ 600→ 509→ ....

3. Press the PLAY button. Confirm that the capstan turns a little, and then stops.

4. Press the following buttons so that the following specification is satisfied.

   Equipment: Oscilloscope
   Test point: CH-2:TP201/SS-57 (57A) Board
   Trigger: CH-1:TP203/SS-57 (57A) Board
   Adjustment button:
   F FWD button, REW button
   Specification:

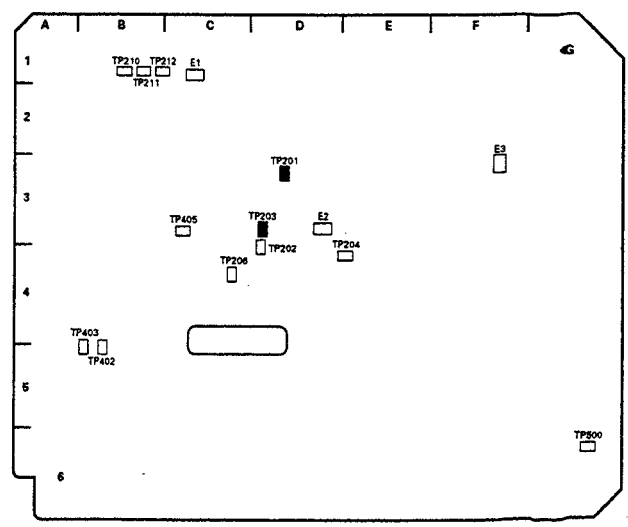
OK



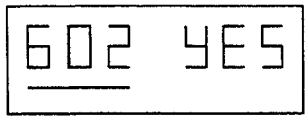
No interval between underline of waveform.

NG

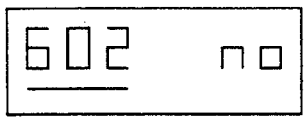
SS-57/57A BOARD -A SIDE-



5. Press the RESET(MENU SET) button, and confirm the following indication in the display window.



If following figure displayed, press the STOP button and exit the menu number 602. And perform procedure 2 and later.
When the menu has no change, check the unit error.



6. Press alternately the STOP and PLAY buttons sereal times, confirm the specification is satisfied.

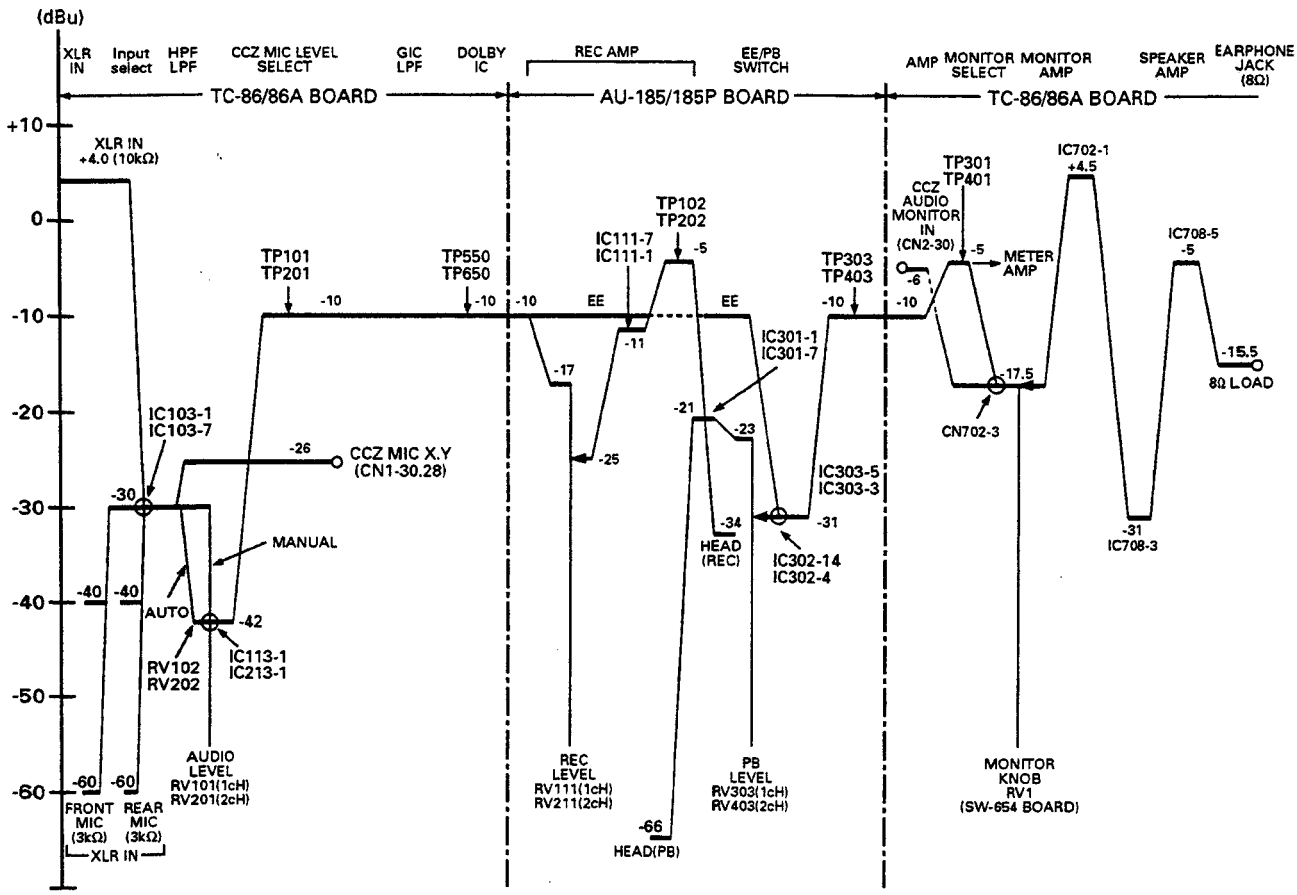
7. Put the unit into Enter the STOP mode.(Press the STOP button.)

8. Press the MENU button to exit the maintenance menu. The display window returns to the state before entering the maintenance menu.

9-4. AUDIO ALIGNMENT

[Level Diagram]

AUDIO SYSTEM LEVEL DIAGRAM



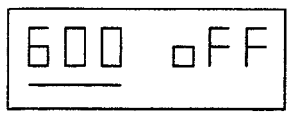
[Menu Selection]

In the following audio alignment, change the setting of system menu numbers 303 and 306.

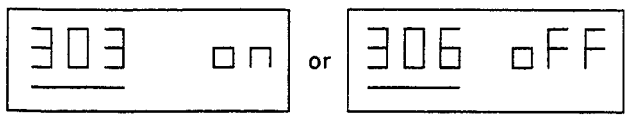
9-4-1. Audio Level Volume Reference Position Adjustment
9-4-2. Limiter Level Adjustment
9-4-3. Meter Level Adjustment
9-4-8. Overall Recording Level Adjustment
9-4-9. Overall Dolby Frequency Response Adjustmnet
9-4-10. Overall Channel Phase Adjustment

How to set the menu numbers 303 and 306 is as follows.

1. How to set the menu number 303 to "OFF" or 306 to "ON"
   (1)While pressing the SHIFT button, press the MENU button. And then remove a hand from the SHIFT button and keep pressing the MENU button more than 1 second.
   Indication in the display window
   (In the following description, an underscore indicates a portion of the display which is blinking.)

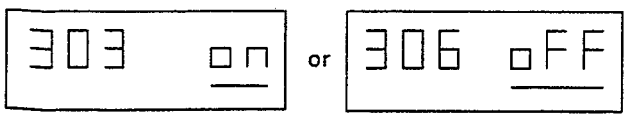


   (2)Press the ADVANCE button or SHIFT button, then menu number (303 or 306) is indicated.
   Indication in the display window



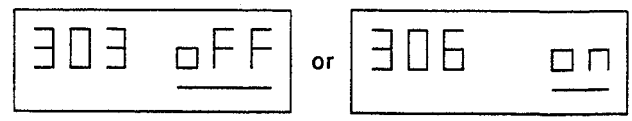
   Whenever pressing the ADVANCE button, indication cycles through the following menu number.
   600→ 301→ . . . .→ 305→ 306→ . . . .
   Whenever pressing the SHIFT button, indication cycles through the following menu number.
   600→ 509→ . . . .→ 307→ 306→ . . . .

   (3)Press the RESET(MENU SET) button once, then "ON/OFF" side is blinking.
   Indication in the display window



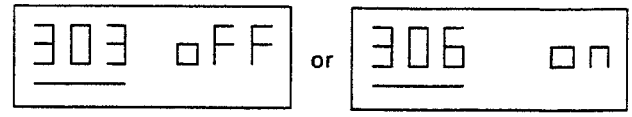
   Whenever pressing the RESET(MENU SET) button, menu number (303 or 306) and current setting (ON or OFF) is blinking alternately.

   (4)Press the ADVANCE button once, then select "ON/OFF".
   Indication in the display window



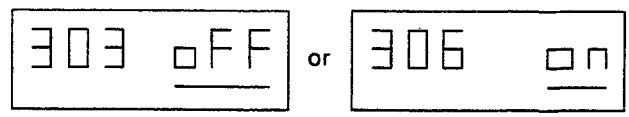
   Whenever pressing the ADVANCE button, "ON" setting and "OFF" setting is alternately.

   (5)Press the RESET(MENU SET) button once.
   Indication in the display window



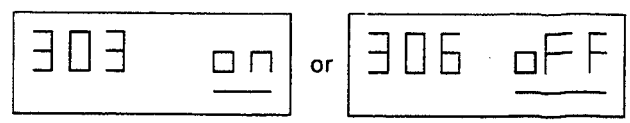
   Whenever pressing the RESET(MENU SET) button, menu number (303 or 306) and current setting (OFF or ON) is blinking alternately.

2. How to exit system menu by setting the menu number 303 to "ON" or 306 to "OFF".
   (1)Press the RESET(MENU SET) button, then "ON/OFF" side is blinking.
   Indication in the display window.



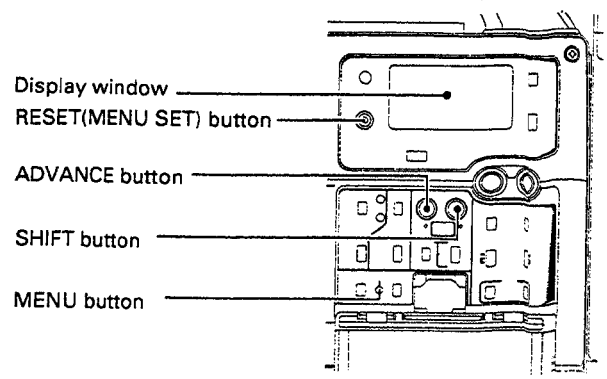
   Pressing the RESET(MENU SET) button changes menu number or current setting blinking alternately.

   (2)Press the ADVANCE button once, then select "ON/OFF".
   Indication in the display window.



   Whenever pressing the ADVANCE button, "ON" setting and "OFF" setting is alternately.

   (3)Press the MENU button.
   The display window returns to the state before entering the system menu.



9-4-1. Audio Level Volume Reference Position Adjustment

Equipment: Audio Level Meter, Audio Signal Generator
Preparation:
- Set the AUDIO SELECT switches to MANUAL position.
- Set the menu numbers 303 to "OFF" and 306 to "ON".
- AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
- EE mode

Connection: CONNECTION 1
Test point: TP101/TC-86 (86A) Board (CH-1)
TP201/TC-86 (86A) Board (CH-2)
Adjusting point:
RV102/TC-86 (86A) Board (CH-1)
RV202/TC-86 (86A) Board (CH-2)
Specification: −10.0 ± 0.1 dBu

Note: After the adjustment, be sure to set the menu numbers 303 to "ON", 306 to "OFF" and set the AUDIO SELECT switches to AUTO position.

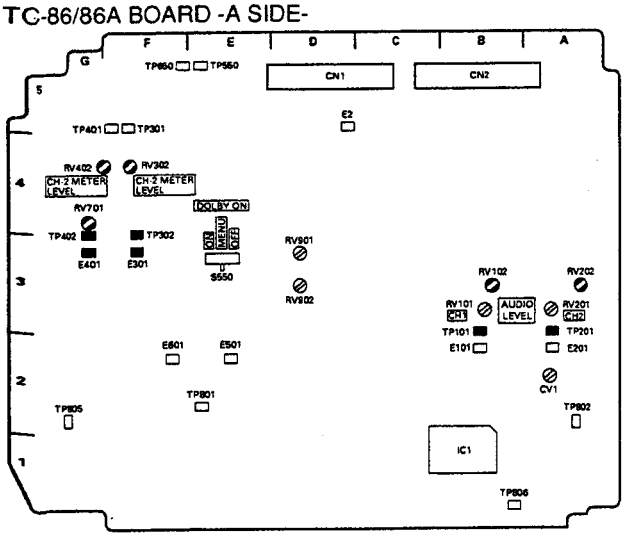
9-4-2. Limiter Level Adjustment

Equipment: Audio Level Meter, Audio Signal Generator
Preparation:
- Set the AUDIO SELECT switches to MANUAL position.
- Set the menu number 306 to ON.
- AUDIO INPUT CH-1/CH-2: 1 kHz, + 14 dBu
- EE mode

Connection: CONNECTION 1
Test point: TP101/TC-86 (86A) Board (CH-1)
TP201/TC-86 (86A) Board (CH-2)
Adjusting point:
RV701/TC-86 (86A) Board (CH-1)
Specification: [for NTSC] −0.5 ± 0.2 dBu
[for PAL] −1.5 ± 0.2 dBu

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

TC-86/86A BOARD -A SIDE-



9-4-3. Meter Level Adjustment

Equipment: Digital Voltmeter, Audio Signal Generator
Preparation:
- Set the AUDIO SELECT switches to MANUAL position.
- Set the menu number 306 to ON.
- AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
- EE mode

Connection: CONNECTION 1
Test point: TP302/TC-86 (86A) Board (CH-1)
GND: E301
TP402/TC-86 (86A) Board (CH-2)
GND: E401
Adjusting point:
RV302/TC-86 (86A) Board (CH-1)
RV402/TC-86 (86A) Board (CH-2)
Specification: 1.47 ± 0.01 V dc

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

9-4-4. Playback Frequency Response Adjustment

Equipment: Audio Level Meter
Preparation:
- Set the menu number 603 to ON. (Refer to page 2-59.)
- Insert an alignment tape (CR8-1A or CR8-1B PS) into the unit and play back the 40 Hz,1 kHz,7 kHz,10 kHz, 15 kHz and - 20 VU portions (5:00-8:00).

Connection: CONNECTION 1
Test point: TP303/AU-185 (185P) Board (CH-1)
TP403/AU-185 (185P) Board (CH-2)
Adjusting point:
RV302/AU-185 (185P) Board (CH-1)
RV402/AU-185 (185P) Board (CH-2)
Specification:
CH-1 and CH-2

Frequency (Hz)	Output level (dB)
40	0 ± 3
1 k	0 (Reference)
7 k	0 ± 1
10 k	0 ± 1
15 k	0 ± 1.5

- When the specification is not satisfied at the 10 kHz portion, solder the following points and perform the adjustment again.
CH-1: SL301/AU-185 (185P) Board
CH-2: SL401/AU-185 (185P) Board

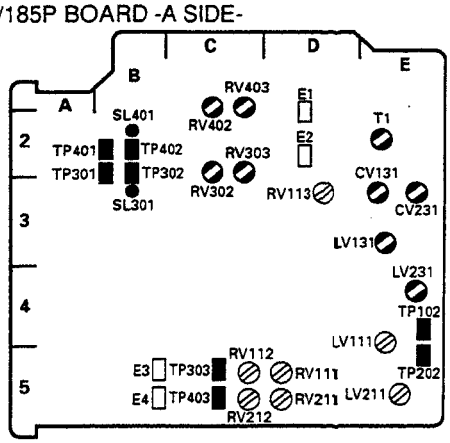
Note: Each output level should be calibrated with the calibration value. (Refer to page 9-1 or 9-2.)
After the adjustment, be sure to set the menu number 603 to OFF.

9-4-5. Playback Reference Level Adjustment

Equipment: Audio Level Meter
Preparation:
- Set the menu number 603 to ON. (Refer to page 2-59.)
- Insert an alignment tape (CR8-1A or CR8-1B PS) into the unit and play back the 1 kHz,0 VU portion (0:00-3:00).

Connection: CONNECTION 1
Test point: TP303/AU-185 (185P) Board (CH-1)
TP403/AU-185 (185P) Board (CH-2)
Adjusting point:
RV303/AU-185 (185P) Board (CH-1)
RV403/AU-185 (185P) Board (CH-2)
Specification: −10.0 ± 0.5 dBu
Note: Each output level should be calibrated with the calibration value. (Refer to page 9-1 or 9-2.)
After the adjustment, be sure to set the menu number 603 to OFF.

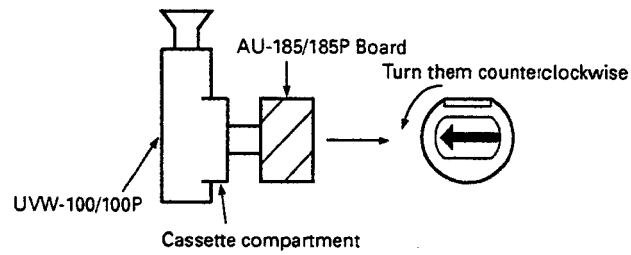
AU-185/185P BOARD -A SIDE-



9-4-6. Bias Trap Adjustment

Equipment: Oscilloscope, Frequency Counter
Connection: CONNECTION 1
Preparation:
1. AUDIO INPUT CH-1/CH-2: No signal
2. Preset the following trimmers to the position as shown in the figure.
CV131/AU-185 (185P) Board
CV231/AU-185 (185P) Board

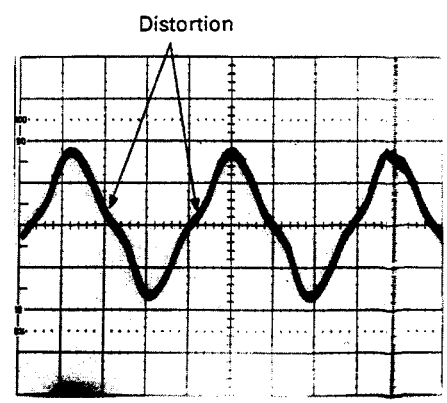
UVW-100/100P upside figure



3. Insert a blank tape (BCT-20MA) into the unit.
4. REC mode.

Adjustment procedure

1. Test point: TP102/AU-185 (185P) Board (CH-1)
TP202/AU-185 (185P) Board (CH-2)
Adjusting point:
LV131/AU-185 (185P) Board (CH-1)
LV231/AU-185 (185P) Board (CH-2)
Equipment: Oscilloscope
Specification:
The distortions of the right and left should be symmetrical.
Note: CH-1 and CH-2 influences each other, so adjust then repeatedly, and the confirm.



50 mV/DIV 2 µs/DIV

2. Test point: TP301/AU-185 (185P) Board (CH-1)
GND: TP302/AU-185 (185P) Board
TP401/AU-185 (185P) Board (CH-2)
GND: TP402/AU-185 (185P) Board
Equipment: Frequency Counter
Specification:
$134\ ^{+5}_{-15}$ kHz

When the specification is not satisfied, turn T1 on the AU-185/185P board.
After the adjustment, check adjustment procedure 1 again.

9-4-7. Bias Current Adjustment

Equipment: Audio Level Meter
Connection: CONNECTION 1
Preparation:
1. AUDIO INPUT CH-1/CH-2: No signal
2. Insert a blank tape (BCT-20MA) into the unit.
3. REC mode.

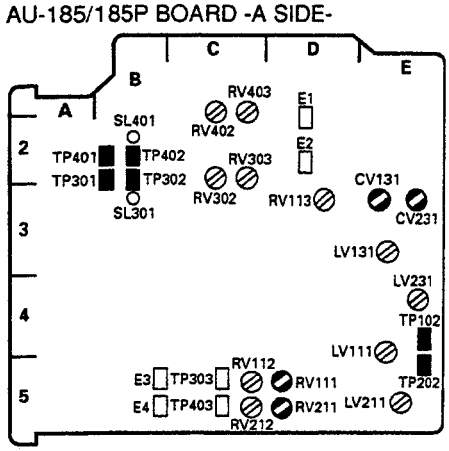
Test point: TP301/AU-185 (185P) Board (CH-1)
GND: TP302/AU-185 (185P) Board
TP401/AU-185 (185P) Board (CH-2)
GND: TP402/AU-185 (185P) Board

Adjusting point:
CV131/AU-185 (185P) Board (CH-1)
CV231/AU-185 (185P) Board (CH-2)

Specification:
17.0 ± 0.5 mV rms

Note: CH-1 and CH-2 influences each other, so adjust then repeatedly, and then confirm.

AU-185/185P BOARD -A SIDE-



9-4-8. Overall Recording Level Adjustment

Use a standard playback unit that audio head phase, playback frequency response and playback level are adjusted by an alignment tape.

Equipment: Audio Level Meter, Audio Signal Generator
Connection: CONNECTION 1
Adjustment procedure:
1. Set the AUDIO SELECT switches to MANUAL position.
2. Set the menu number 306 to ON.
3. AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
4. Insert a blank tape (BCT-20MA) into the unit.
5. REC mode
6. Play back the recorded portion with the standard playback unit (DOLBY ON).
   Test point: AUDIO OUT CH-1/CH-2 (600 Ω load: Standard playback unit)
   Specification: +4.0 ± 0.2 dBu
   When the specification is not satisfied, perform procedure 7 and later.

7. AUDIO INPUT CH-1/CH-2: 1 kHz, + 4.0 dBu
8. Insert a blank tape (BCT-20MA) into the unit.
9. REC mode
   Test point: TP102/AU-185 (185P) Board (CH-1)
   TP202/AU-185 (185P) Board (CH-2)
   Adjusting point:
   RV111/AU-185 (185P) Board (CH-1)
   RV211/AU-185 (185P) Board (CH-2)
   Specification: Correct the output level of procedure 6 to just enough.

Correction value = Difference level
= Specification value (+ 4.0 dBu)
– Measured value

Example) Specification value + 4.0 dBu
Measured value + 5.0 dBu
Correction value = + 4.0 dBu – (+5.0 dBu)
= – 1.0 dBu

After the adjustment, check procedure 6 again.

REC
↓
Measuring
(Play back with a standard playback unit)
↓
Ajustment

Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

9-4-9. Overall Dolby Frequency Responce Adjustment

Use a standard playback unit that audio head phase, playback frequency response and playback level are adjusted by an alignment tape.

Equipment: Audio Level Meter, Audio Signal Generator
Connection: CONNECTION 1
Adjustment procedure:

1. Set the AUDIO SELECT switches to MANUAL position.
2. Set the menu number 306 to ON.
3. AUDIO INPUT CH-1/CH-2: 40 Hz, 1 kHz, 7 kHz, 10 kHz, 15 kHz, –16 dBu
4. Insert a blank tape(BCT-20MA) into the unit.
5. REC mode
6. Play back the recorded portion with the standard playback unit(DOLBY ON).
   Test point: AUDIO OUT CH-1/CH-2(600 Ω load: Standard playback unit)
   Specification:
   CH-1 and CH-2

Frequency (Hz)	Output level (dB)
40	$0^{+1.0}_{-3.0}$
1k	0 (Reference)
7 k	0 ± 1.0
10 k	$0^{+1.0}_{-1.5}$
15 k	$0^{+1.0}_{-2.5}$

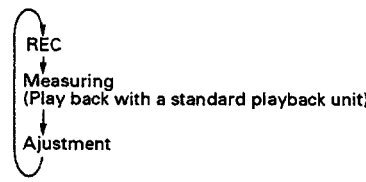
   When the specification is not satisfied, perform procedure 7 and later.

   Note: Each output level should be calibrated with the calibration value.
   (Refer to page 9-1 or 9-2.)
7. AUDIO INPUT CH-1/CH-2: 10 kHz,15 kHz,- 16 dBu
8. Insert a blank tape(BCT-20MA) into the unit.
9. REC mode
   Test point: TP102/AU-185 (185P) Board (CH-1)
   TP202/AU-185 (185P) Board (CH-2)
   Adjusting point:
   Adjustment at 10 kHz portion
   RV112/AU-185 (185P) Board (CH-1)
   RV212/AU-185 (185P) Board (CH-2)
   Adjustment at 15 kHz portion
   LV111/AU-185 (185P) Board (CH-1)
   LV211/AU-185 (185P) Board (CH-2)
   Specification: Correct the half of the difference level from the center value of the specification in procedure 6.

Difference level = Specification value
– Measured value
Correction value = 1/2 x Difference level
= 1/2 x (Specification value
– Measured value)

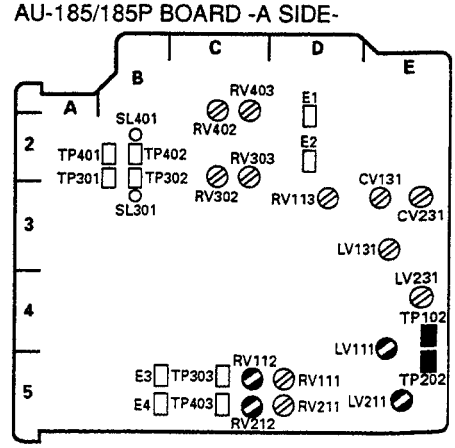
Example) Specification value 0 dB
Measured value + 2.0 dB
Correction value = 1/2 x (0 dB – (+2.0 dB))
= – 1.0 dB

After the adjustment, check procedure 6 again.



Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

AU-185/185P BOARD -A SIDE-

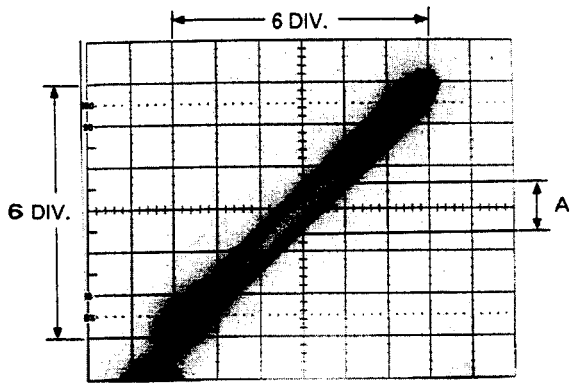


9-4-10. Overall Channel Phase Adjustment

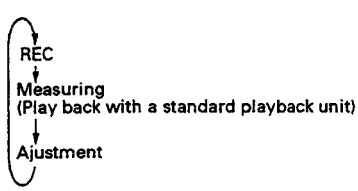
Use a standard playback unit that audio head phase, playback frequency response and playback level are adjusted by an alignment tape.

Equipment: Audio Level Meter, Audio Signal Generator, Oscilloscope
Connection: CONNECTION 1
Adjustment procedure:

1. Set the AUDIO SELECT switches to MANUAL position.
2. Set the menu number 306 to ON.
3. AUDIO INPUT CH-1/CH-2: 15 kHz,+ 4.0 dBu
4. Insert a blank tape(BCT-20MA) into the unit.
5. REC mode
6. Play back the recorded portion with the standard playback unit(DOLBY ON).
   Oscilloscope: X-Y mode (lissajous waveform)
   Test point: AUDIO OUT CH-1/CH-2(600 Ω load: Standard playback unit)
   Specification: A(phase difference) = within 10°
   When the specification is not satisfied, perform procedure 7 and later.
   Note: 1 DIV. = about 10°

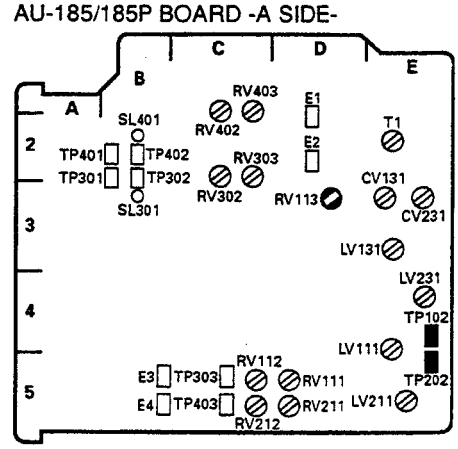


7. AUDIO INPUT CH-1/CH-2: 15 kHz, +4.0 dBu
8. Insert a blank tape(BCT-20MA) into the unit.
9. REC mode
   Test point: CH-1: TP102/AU-185 (185P) Board
   CH-2: TP202/AU-185 (185P) Board
   Adjusting point: ◐ RV113/AU-185 (185P) Board
   Specification: Correct the phase difference of procedure 6.
   After the adjustment, check procedure 6 again.



Note: After the adjustment, be sure to set the menu number 306 to OFF and set the AUDIO SELECT switches to AUTO position.

AU-185/185P BOARD -A SIDE-

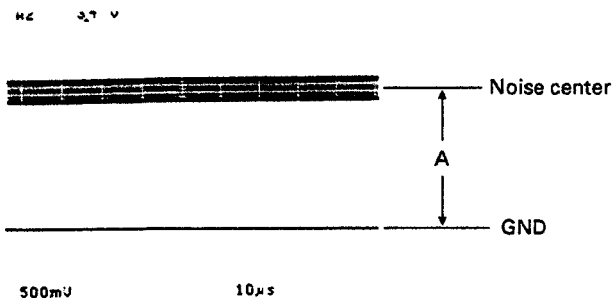


9-5. VIDEO ALIGNMENT

9-5-1. PLL VCO Error Voltage Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP401/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘ LV400/VO-46 (46A) Board
Specification: A = 1.8 ± 0.1 V dc

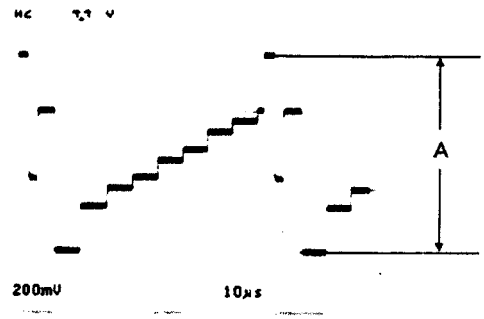


9-5-2. Y Input Level Adjustment

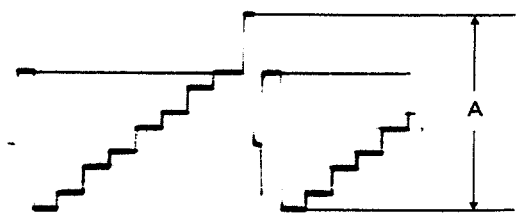
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP101/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘ RV100/VO-46 (46A) Board
Specification: A = 1.00 ± 0.05 V p-p

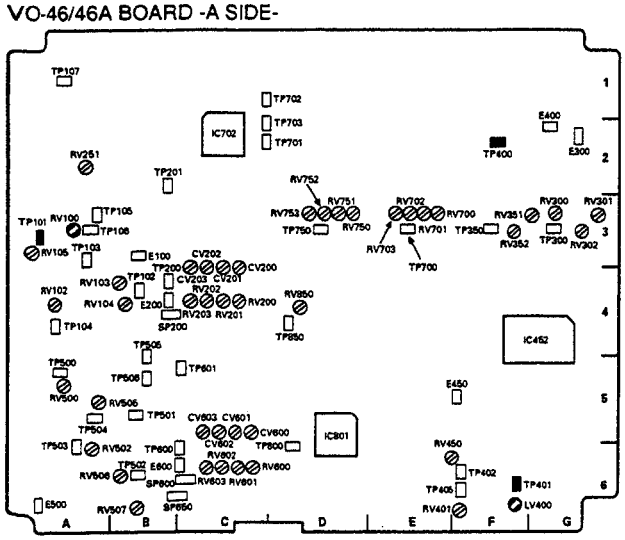
for NTSC



for PAL



VO-46/46A BOARD -A SIDE-

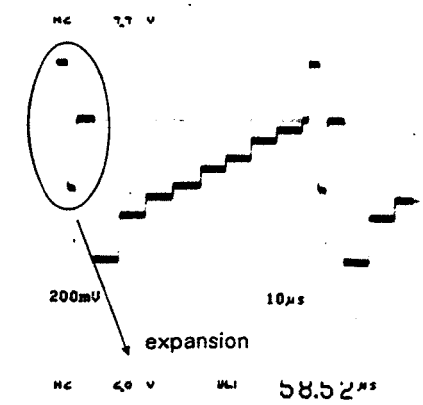


9-5-3. Y REF SYNC Position Adjustment

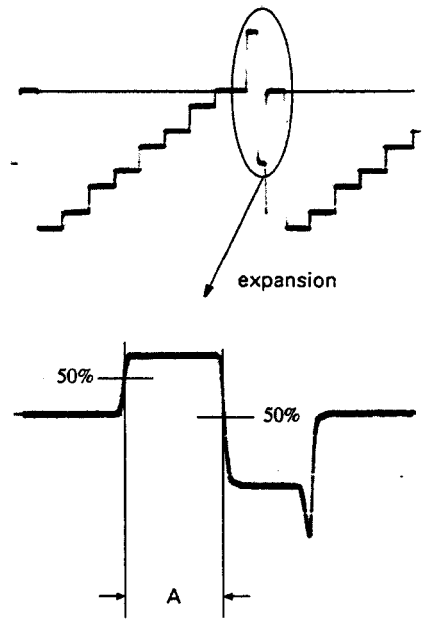
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP101/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘RV401/VO-46 (46A) Board
Specification: A = 2.65 ± 0.02 µs

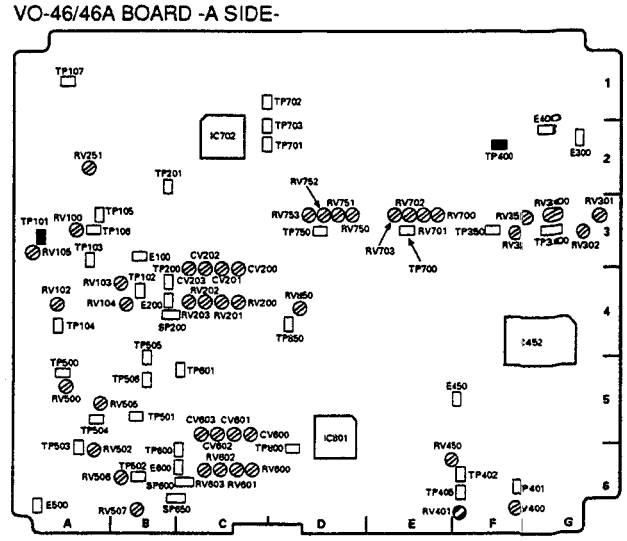
for NTSC



for PAL



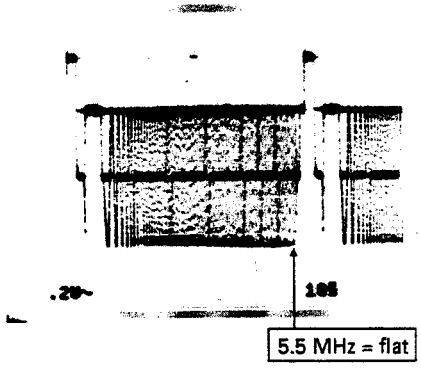
VO-46/46A BOARD -A SIDE-



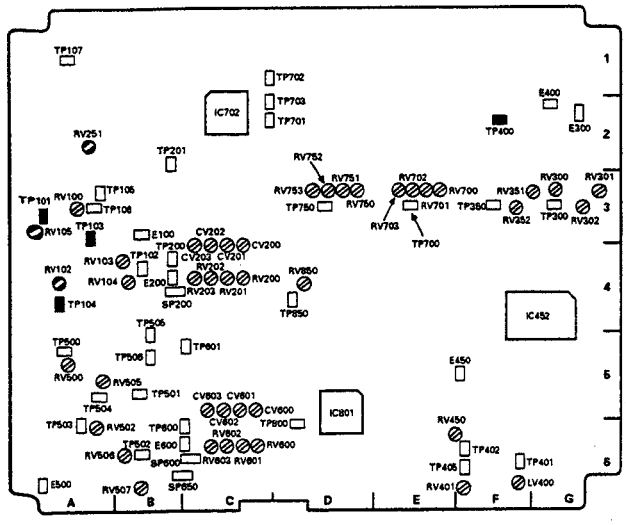
9-5-4. SLEW RATE Limiter Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: 100% NALLOW LINE SWEEP
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP101/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ◐RV251/VO-46 (46A) Board
Specification: 5.5 MHz = flat



VO-46/46A BOARD -A SIDE-

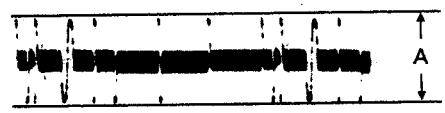


9-5-5. Y Nonlinear Pre-emphasis Mix Level Adjustment

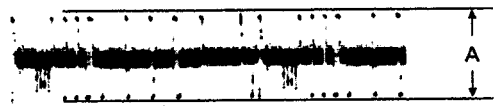
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: [for NTSC] PULSE & BAR(2T)
  [for PAL] PULSE & BAR(2, 4T)
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP103/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ◐RV102/VO-46 (46A) Board
Specification: A=100 ± 5mV

for NTSC



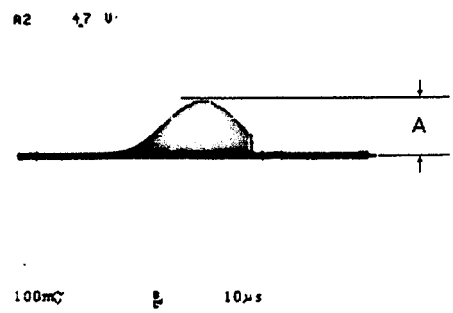
for PAL



9-5-6. Y REC HF Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: 100% NALLOW LINE SWEEP
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP104/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ◐RV105/VO-46 (46A) Board
Specification: A = 150 ± 5 mV



9-5-7. Y Carrier / Deviation Adjustment (Using a Spectrum analyzer)

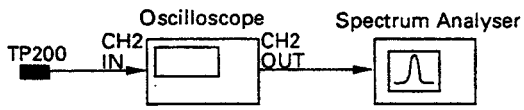
Equipment: Spectrum analyzer, Component Signal Generator, Oscilloscope

Preparation:

- Input signal: 100% FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2

Spectrum analyzer connection



Test point: TP200/VO-46 (46A) Board

Adjusting point:

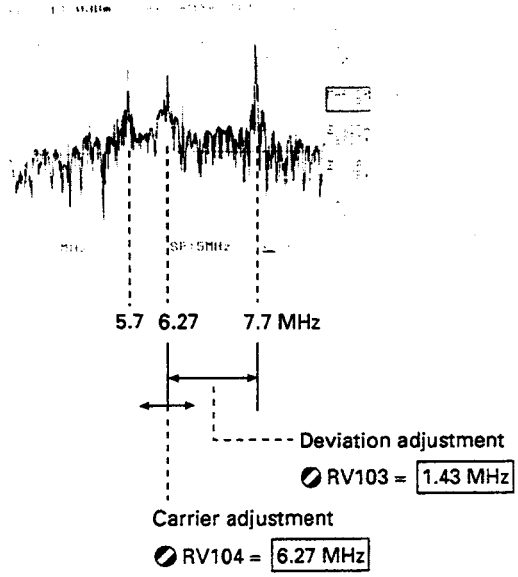
RV103/VO-46 (46A) Board (Deviation adjustment)
RV104/VO-46 (46A) Board (Carrier adjustment)

Specification: [for NTSC] RV103 = 1.43 MHz
[for PAL] RV103 = 1.40 MHz

[for NTSC] RV104 = 6.27 MHz
[for PAL] RV104 = 7.4 MHz

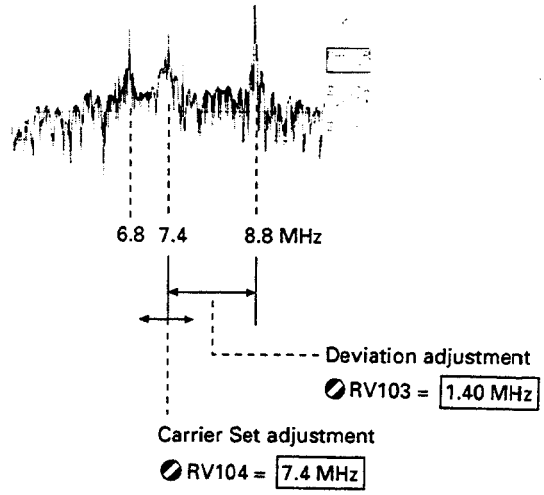
Spectrum analyzer waveform

for NTSC

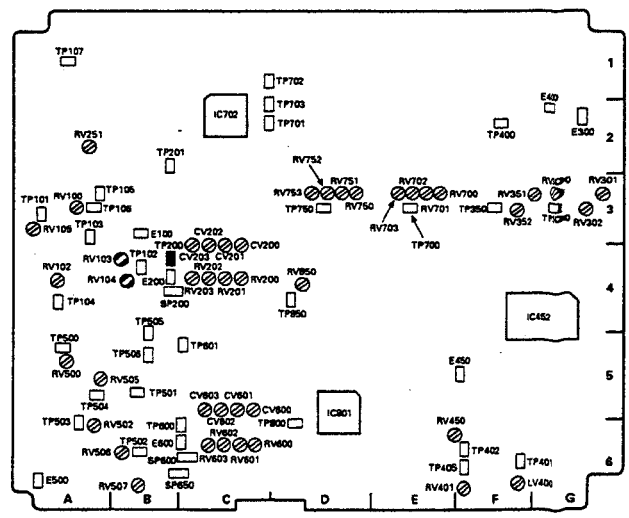


Spectrum analyzer waveform

for PAL



VO-46/46A BOARD -A SIDE-



Y Carrier / Deviation Adjustment
(Using a Deviation checker)

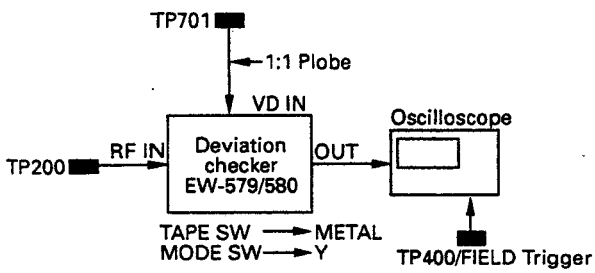
Equipment: Deviation checker, Component Signal Generator, Oscilloscope

Preparation:

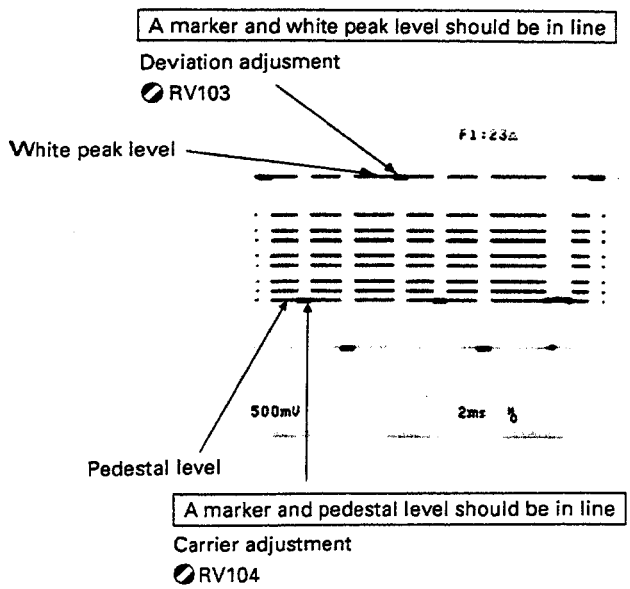
- Input signal: [for NTSC] 75% COLOR BARS
  [for PAL] 100% COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2

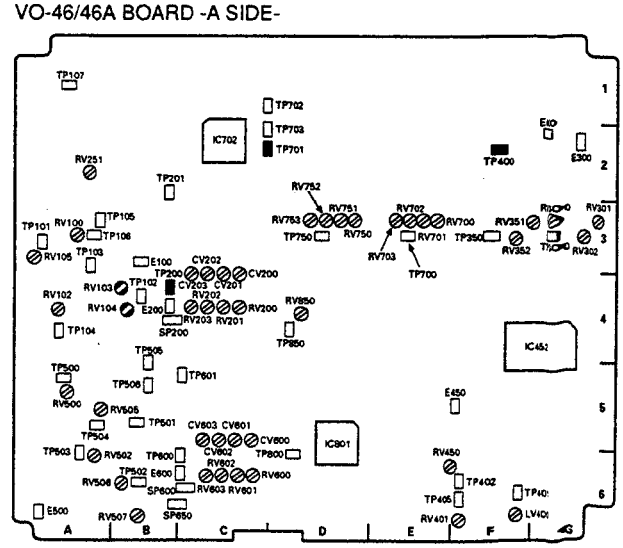
Deviation checker connection



Test point: TP200/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point:
RV103/VO-46 (46A) Board
(Deviation adjustment)
RV104/VO-46 (46A) Board
(Carrier adjustment)
Specification: RV103: A marker and white peak level should be in line.
RV104: A marker and pedestal level should be in line.

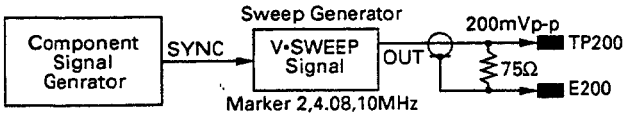


VO-46/46A BOARD -A SIDE-



9-5-8. Y Recording Current Frequency Response Adjustment

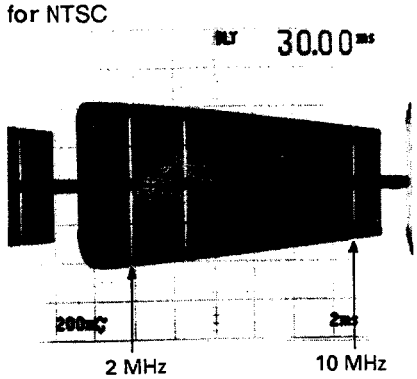
Equipment: Sweep generator, Oscilloscope
Preparation:
- Remove the socket SP200 on the VO-46 (46A) board.
- Connect TP200 and E200 on the VO-46 (46A) board as shown in the following figure.



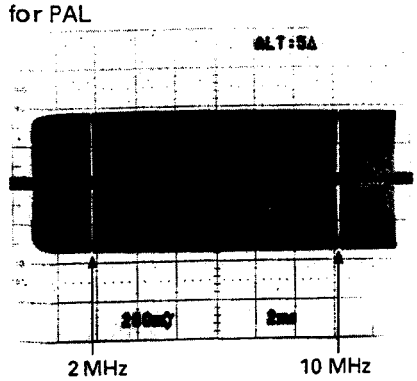
- Sweep generator output signal: V SWEEP (200 mV p-p)
- Input signal: 50% FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Test point: TP201(GND:E200)/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘CV200/VO-46 (46A) Board
Specification: [for NTSC] A(2 MHz) : B(10 MHz) = 100 %(reference) : 75^{+10}_{-5} %
[for PAL] A(2 MHz) : B(10 MHz) = 100 %(reference) : 100^{+5}_{-10} %

for NTSC



for PAL

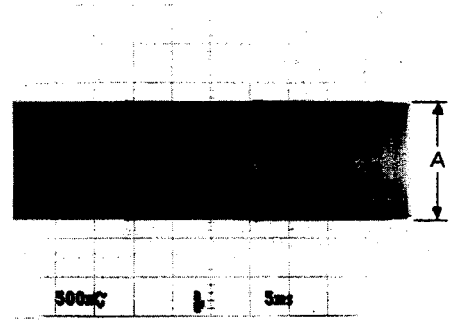


Note:
- After the adjustment, connect the socket SP200.

9-5-9. Y Recording Current Level Adjustment

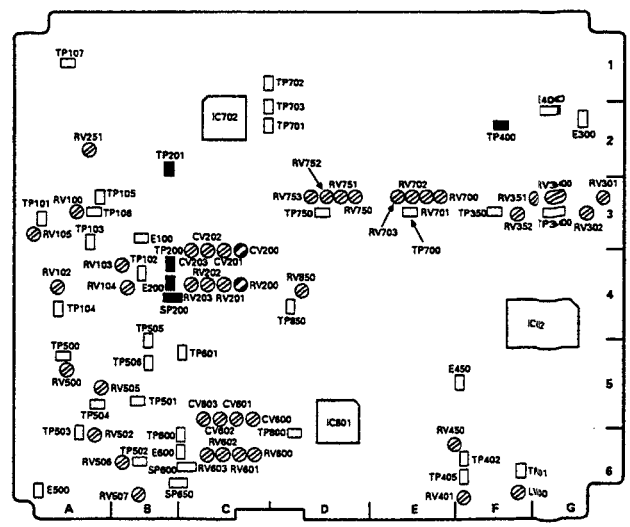
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP201(GND:E200)/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘RV200/VO-46 (46A) Board
Specification: A = 1.50 ± 0.05 V p-p



Note:
- After the adjustment, connect the socket SP200.

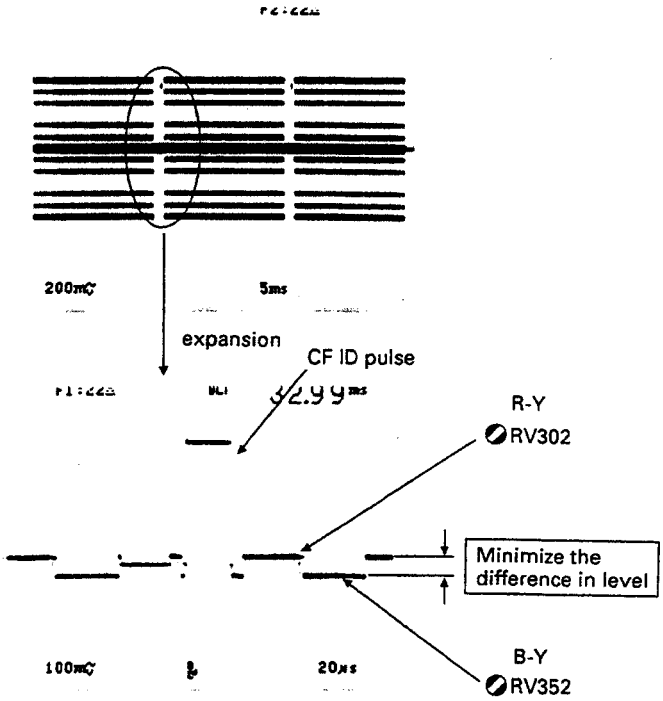
VO-46/46A BOARD -A SIDE-



9-5-10. R-Y, B-Y A/D Clamp Voltage Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

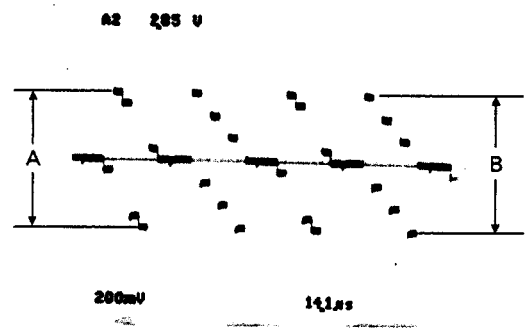
Connection: CONNECTION 2
Test point: TP500/VO-46 (46A) Board
TP400/VO-46 (46A) Board
Adjusting point:
⊘ RV302/VO-46 (46A) Board
(R-Y adjustment)
⊘ RV352/VO-46 (46A) Board
(B-Y adjustment)
Specification: Minimize the difference in level.



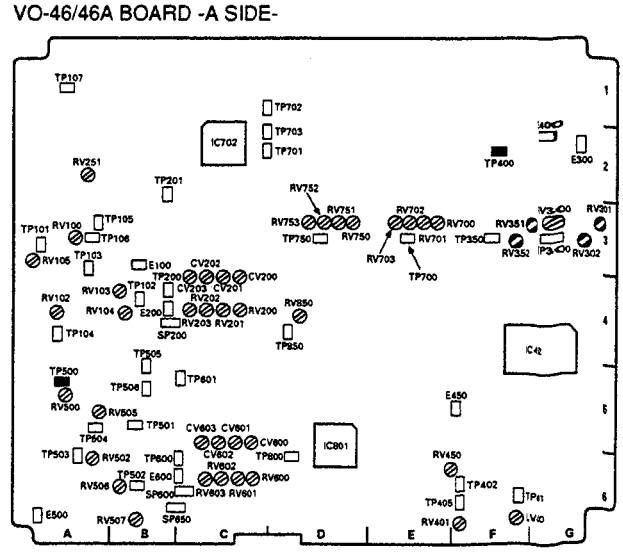
9-5-11. R-Y, B-Y A/D Input Level Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP500/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point:
⊘ RV301/VO-46 (46A) Board
(R-Y adjustment)
⊘ RV351/VO-46 (46A) Board
(B-Y adjustment)
Specification: A (R-Y) = 700 ± 10 mV p-p
B (B-Y) = 700 ± 10 mV p-p



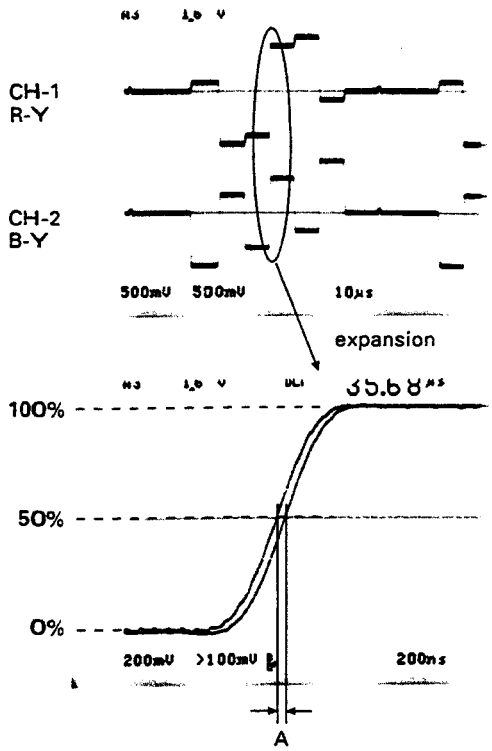
VO-46/46A BOARD -A SIDE-



9-5-12. C/C Delay Tentative Adjustment (After this adjustment, perform 9-5-26. Recording C/C Delay Adjustment.)

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

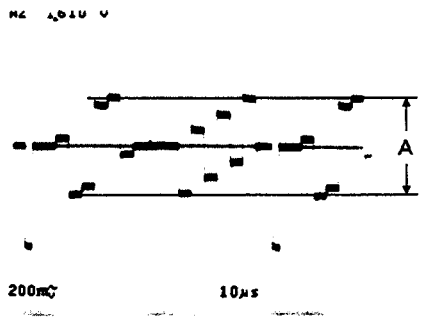
Connection: CONNECTION 2
Test point: CH-1: TP300/VO-46 (46A) Board (R-Y)
CH-2: TP350/VO-46 (46A) Board (B-Y)
Trigger: TP400/VO-46 (46A) Board
Adjusting point: RV300/VO-46 (46A) Board
Specification: A = 0 ± 5 ns



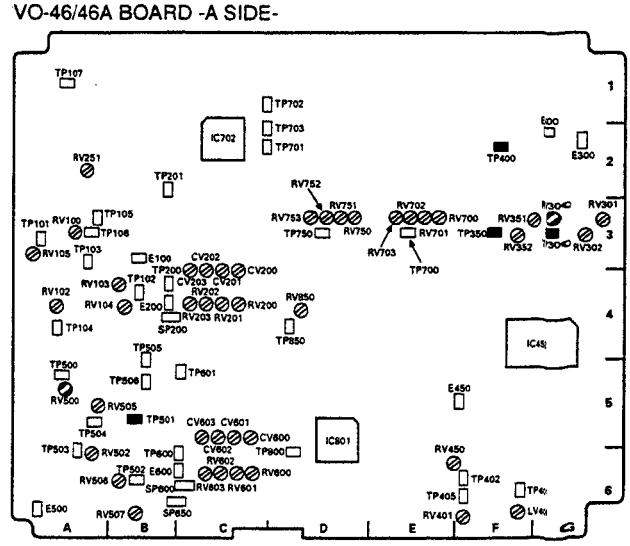
9-5-13. CTDM Level Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP501/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: RV500/VO-46 (46A) Board
Specification: [for NTSC] A=500 ± 10mV
[for PAL] A=667 ± 10mV



VO-46/46A BOARD -A SIDE-

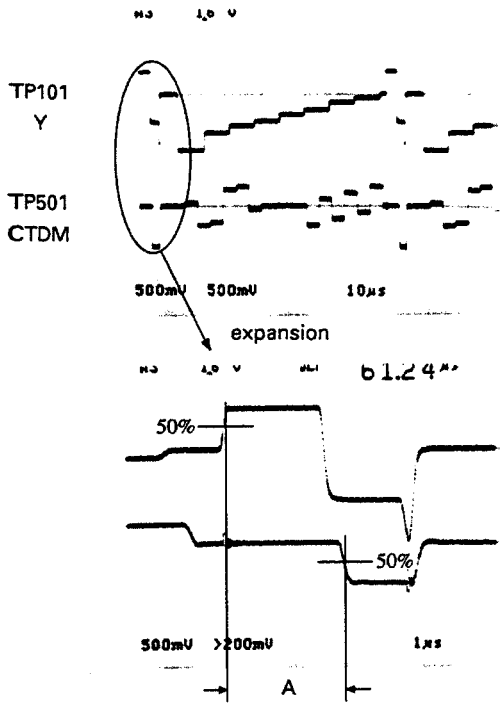


9-5-14. C REF SYNC Position Tentative Adjustment (After this adjustment, perform 9-5-26. Recording C/C Delay Adjustment.)

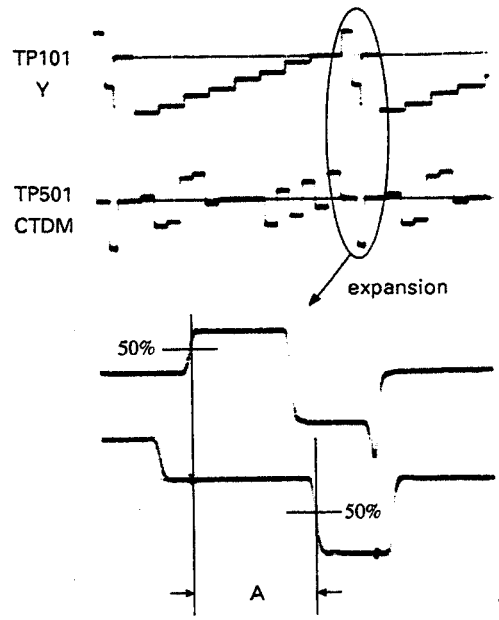
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: CH-1: TP101/VO-46 (46A) Board (Y)
CH-2: TP501/VO-46 (46A) Board (CTDM)
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘RV450/VO-46 (46A) Board
Specification: A = 3.2 ± 0.1 µs

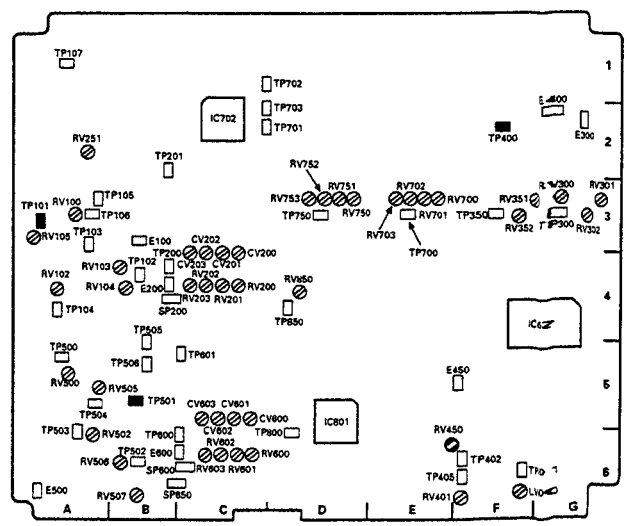
for NTSC



for PAL



VO-46/46A BOARD -A SIDE-

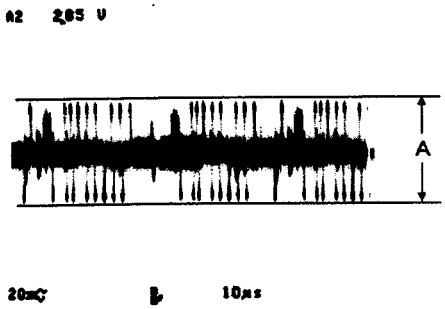


9-5-15. C Nonlinear Pre-emphasis Mix Level Adjustment

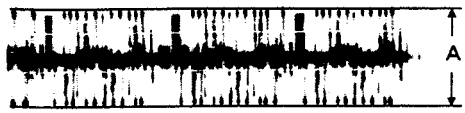
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: PULSE & BAR (2,4 T)
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP503/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘ RV502/VO-46 (46A) Board
Specification: A=75 ± 5mV

for NTSC



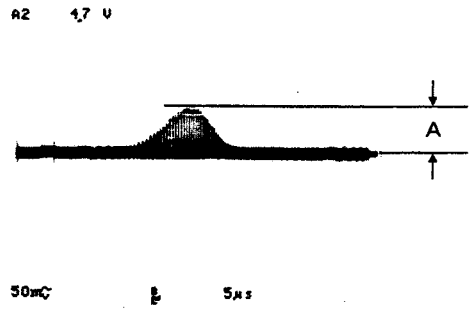
for PAL



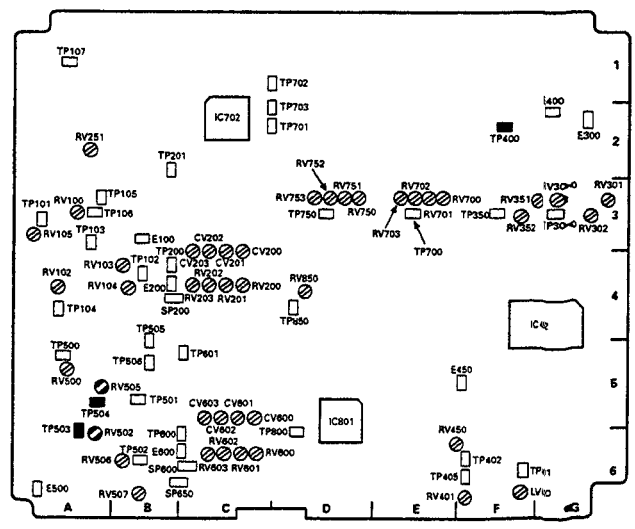
9-5-16. C REC HF Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input singnal: 100% NALLOW LINE SWEEP
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2
Test point: TP504/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘ RV505/VO-46 (46A) Board
Specification: [for NTSC] A=60 ± 5mV
[for PAL] A=100 ± 5mV



VO-46/46A BOARD -A SIDE-



9-5-17. C Carrier / Deviation Adjustment (Using a Spectrum analyzer)

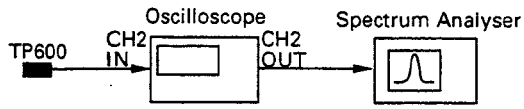
Equipment: Spectrum analyzer, Component Signal Generator, Oscilloscope

Preparation:

- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2

Spectrum analyzer connection



Test point: TP600/VO-46 (46A) Board

Adjusting point:

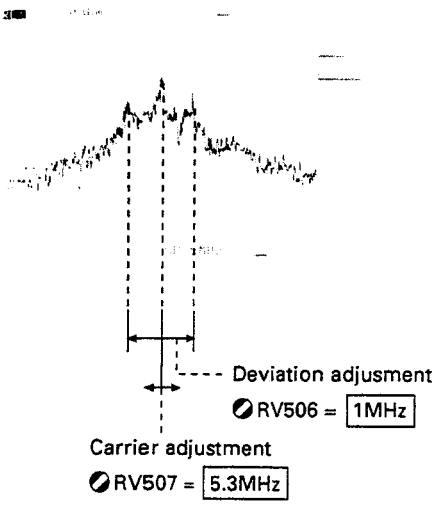
RV506/VO-46 (46A) Board (Deviation Adjustment)

RV507/VO-46 (46A) Board (Carrier Adjustment)

Specification: RV506 = 1 MHz
[for NTSC] RV507 = 5.3 MHz
[for PAL] RV507 = 6.1 MHz

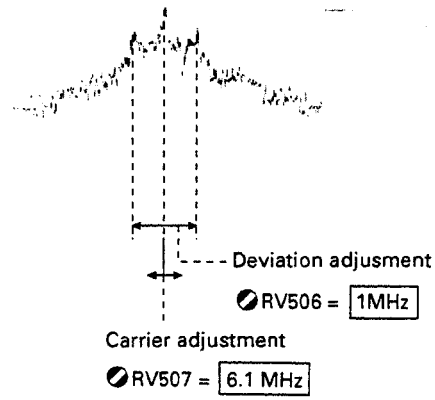
Spectrum analyzer waveform

for NTSC

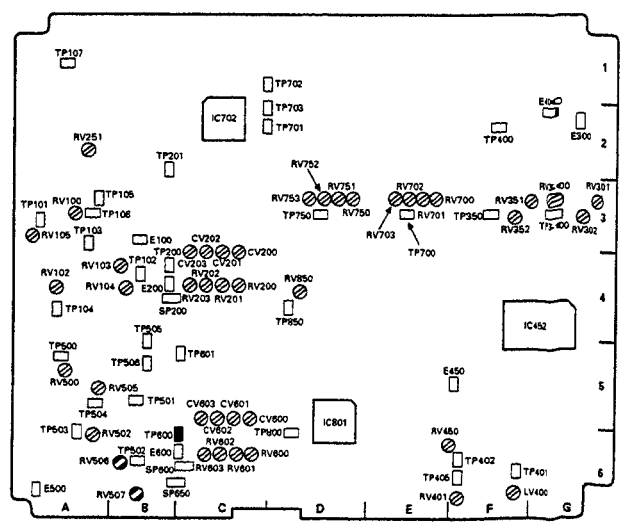


Spectrum analyzer waveform

for PAL



VO-46/46A BOARD -A SIDE-



C Carrier / Deviation Adjustment
(Using a Deviation checker)

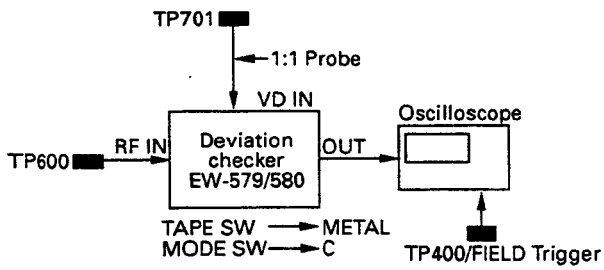
Equipment: Deviation checker, Component Signal Generator, Oscilloscope

Preparation:

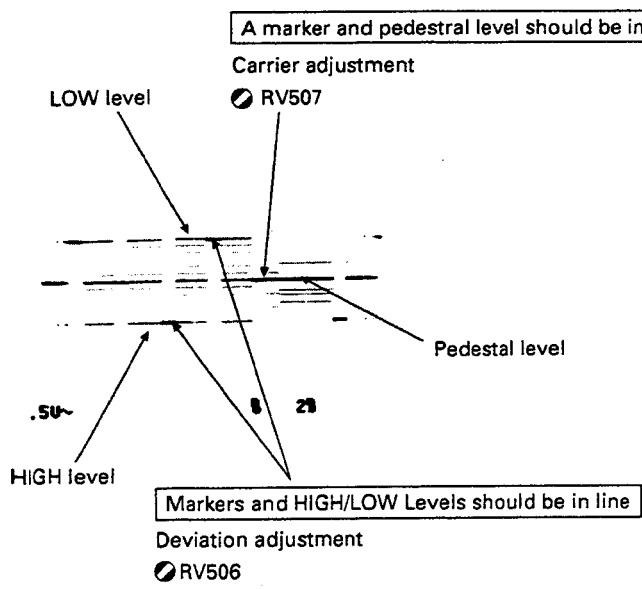
- Input signal: [for NTSC] 75 % COLOR BARS
  [for PAL] 100 % COLOR BARS
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection: CONNECTION 2

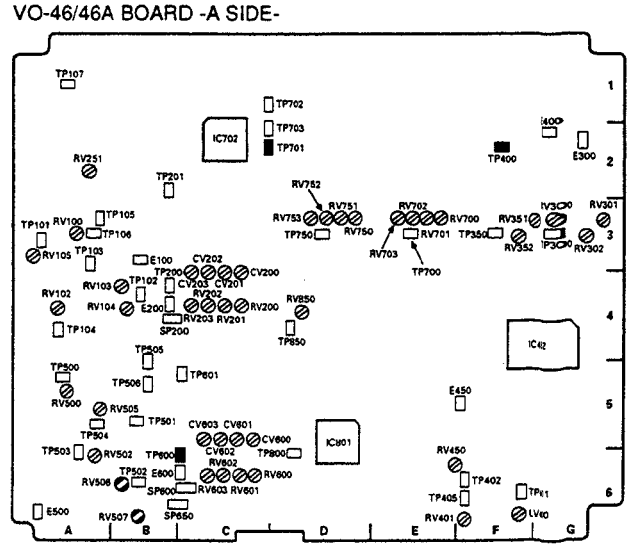
Deviation checker connection



Test point: TP600/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point:
RV506/VO-46 (46A) Board
(Deviation adjustment)
RV507/VO-46 (46A) Board
(Carrier adjustment)
Specification: RV506: Markers and HIGH/LOW levels should be in line.
RV507: A marker and pedestal level should be in line.

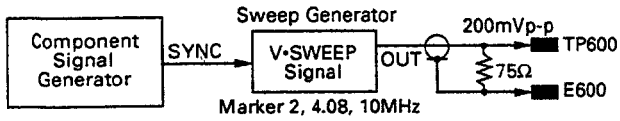


VO-46/46A BOARD -A SIDE-



9-5-18. C Recording Current Frequency Response Adjustment

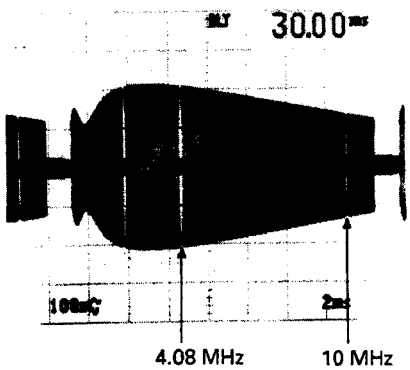
Equipment: Sweep Generator, Oscilloscope
Preparation:
- Remove the socket SP600 and SP650 on the VO-46 (46A) board.
- Connect TP600 and E600 on the VO-46 (46A) board as shown in the following figure.



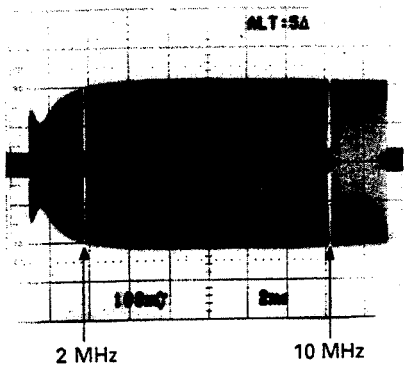
- Sweep generator output signal: V SWEEP (200 mV p-p)
- Input signal: 50% FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Test point: TP601(GND:E600)/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ⊘CV600/VO-46 (46A) Board
Specification:[for NTSC] A(4.08 MHz) : B(10 MHz) = 100 %(reference) : 62^{+10}_{-5} %
[for PAL] A(2 MHz) : B(10 MHz) = 100 %(reference) : 100^{+5}_{-10} %

for NTSC



for PAL

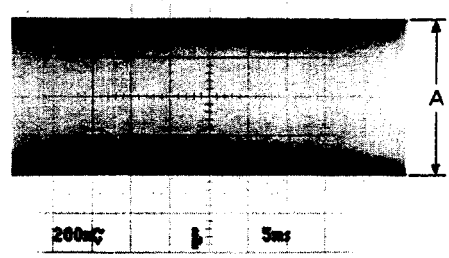


Note:
- After the adjustment, connect the socket SP600 and SP650.

9-5-19. C Recording Current Level Adjustment

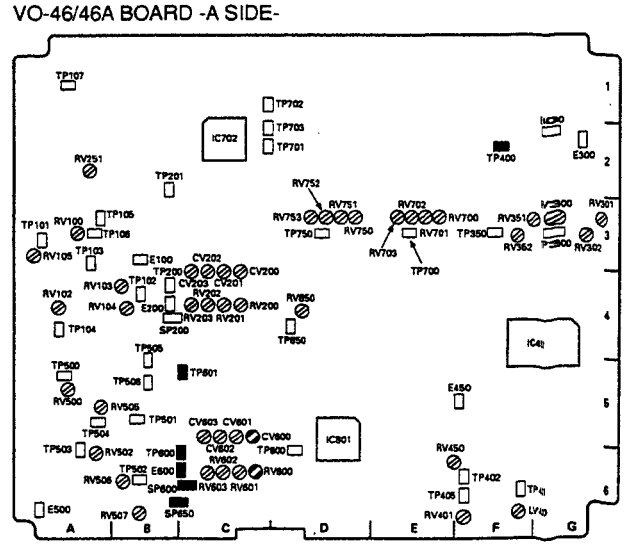
Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Remove the socket SP650 on the VO-46 board.
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection : CONNECTION 2
Test point: TP601(GND:E600)/VO-46 Board
Adjusting point: ⊘RV600/VO-46 Board
Specification:[for NTSC] A=0.80 ± 0.05 Vp-p
[for PAL] A=0.90 ± 0.05 VP-P



Note:
- After the adjustment, connect the socket SP650.

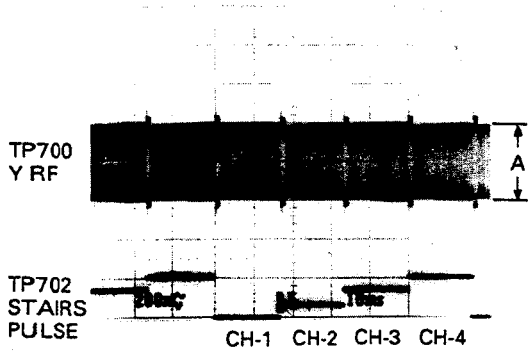
VO-46/46A BOARD -A SIDE-



9-5-20. Y RF Level Adjustment

Equipment: Oscilloscope
Preparation:
- Insert an alignment tape (CR5-1B or CR5-1B PS) into the unit, and playback the FLAT FIELD portion (24:00-26:00).

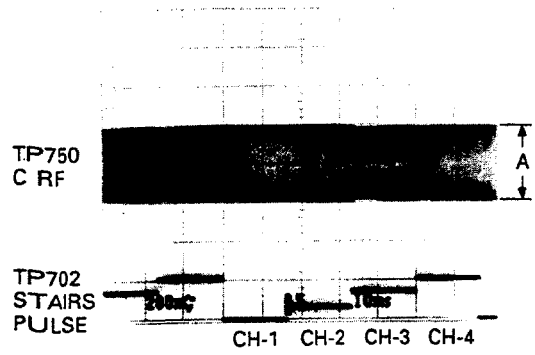
Test point: TP700/VO-46 (46A) Board
Trigger: TP702/VO-46 (46A) Board
Adjusting point:
CH-1 RV700/VO-46 (46A) Board
CH-2 RV701/VO-46 (46A) Board
CH-3 RV702/VO-46 (46A) Board
CH-4 RV703/VO-46 (46A) Board
Specification: A = 400 ± 20 mV



9-5-21. C RF Level Adjustment

Equipment: Oscilloscope
Preparation:
- Insert an alignment tape (CR5-1B or CR5-1B PS) into the unit, and playback the FLAT FIELD portion (24:00-26:00).

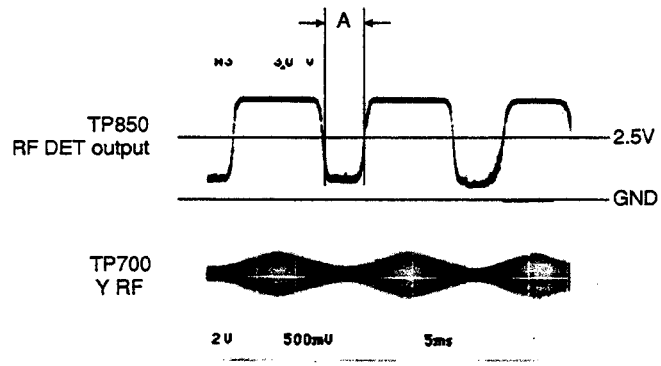
Test point: TP750/VO-46 (46A) Board
Trigger: TP702/VO-46 (46A) Board
Adjusting point:
CH-1 RV750/VO-46 (46A) Board
CH-2 RV751/VO-46 (46A) Board
CH-3 RV752/VO-46 (46A) Board
CH-4 RV753/VO-46 (46A) Board
Specification: A = 400 ± 20 mV p-p



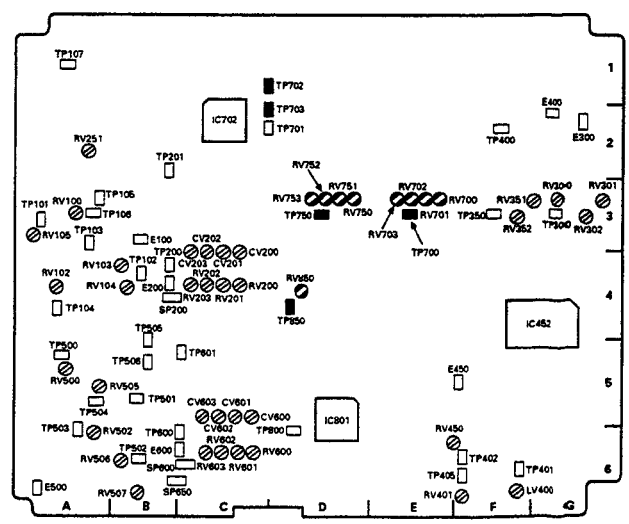
9-5-22. RF Alarm Adjustment

Equipment: Component Signal Generator, Oscilloscope
Preparation:
- Input signal: 50 % FLAT FIELD
- Insert a blank tape (BCT-20MA) into the unit.
- Put the unit into PLAY mode for a few seconds, and put the unit into PLAY PAUSE mode. Then turn the following control knob.

Connection: CONNECTION 2
Test point: CH-1:TP850/VO-46 (46A) Board
CH-2:TP700/VO-46 (46A) Board
Trigger: TP703/VO-46 (46A) Board
Adjusting point: RV850/VO-46 (46A) Board
Specification: A = 5 ± 1 ms



VO-46/46A BOARD -A SIDE-



9-5-23. Overall Y Recording Frequency Response Check

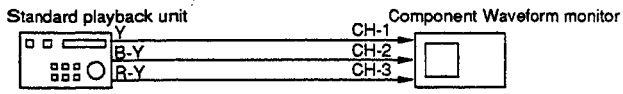
for NTSC

Equipment: Component Signal Generator, Oscilloscope or Component Waveform monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B)

Connection: CONNECTION 2

Component Waveform monitor connection



Test point: Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Playback the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.5 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 9-5-8. Y Recording Current Frequency Response Adjustment within the specification again.

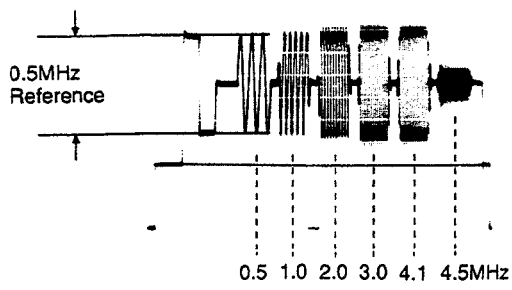
Overall Y Recording Frequency Response Check		Y Recording Current Frequency Response Adjustment
measure low	⟶	more lower
measure high	⟶	more higher

Specification:

Specification/CH-A and CH-B

Frequency (MHz)	Alignment tape (dB)	(%)
0.5	0 dB (Reference)	100% (Reference)
1.0	± 0.8 dB	$^{+9.6}_{-8.8}$ %
2.0	± 0.8 dB	$^{+9.6}_{-8.8}$ %
3.0	± 1.0 dB	$^{+12.2}_{-10.9}$ %
4.1	± 1.2 dB	$^{+14.8}_{-12.9}$ %

- Measure the levels at the center of Moire.



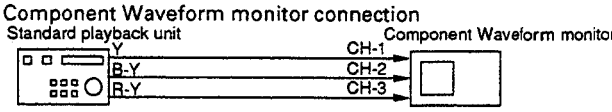
for PAL

Equipment: Component Signal Generator, Oscilloscope or Component Waveform monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B PS)

Connection: CONNECTION 2

Component Waveform monitor connection



Test point: Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Playback the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 2T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 9-5-8. Y Recording Current Frequency Response Adjustment within the specification again.

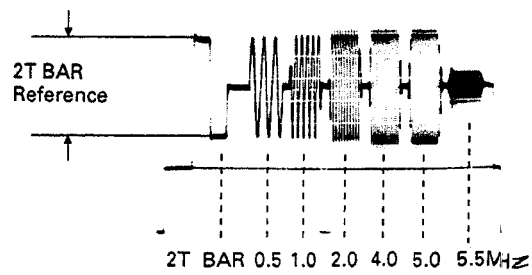
Overall Y Recording Frequency Response Check		Y Recording Current Frequency Response Adjustment
measure low	⟶	more lower
measure high	⟶	more higher

Specification:

Specification/CH-A and CH-B

Frequency (MHz)	Alignment tape (dB)	(%)
2T BAR	0 dB (Reference)	100 % (Reference)
0.5	± 0.8 dB	$^{+9.6}_{-8.8}$ %
1.0	± 0.8 dB	$^{+9.6}_{-8.8}$ %
2.0	± 0.8 dB	$^{+9.6}_{-8.8}$ %
4.0	± 1.0 dB	$^{+12.2}_{-10.9}$ %
5.0	± 1.2 dB	$^{+14.8}_{-12.9}$ %

- Measure the levels at the center of Moire.



9-5-24. Overall C Recording Frequency Responce Check

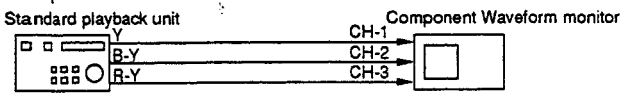
for NTSC

Equipment: Component Signal Generator, Oscilloscope or Component Waveform monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B)

Connection: CONNECTION 2

Component Waveform monitor connection



Test point: R-Y,B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Playback the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 0.2 MHz portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 9-5-18. C Recording Current Frequency Response Adjustment within the specification again.

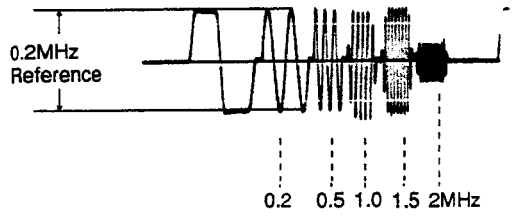
Overall C Recording Frequency Response Check		C Recording Current Frequency Response Adjustment
measure low	⟶	more lower
measure high	⟶	more higher

Specification:

Specification/ CH-A and CH-B

Frequency (MHz)	Alignment tape (dB)	(%)
0.2	0 dB (Reference)	100% (Reference)
0.5	± 0.8 dB	$^{+9.6}_{-8.8}$ %
1.0	± 1.0 dB	$^{+12.2}_{-10.9}$ %
1.5	+ 1.0 dB − 1.5 dB	$^{+12.2}_{-15.9}$ %

- Measure the levels at the center of moire.



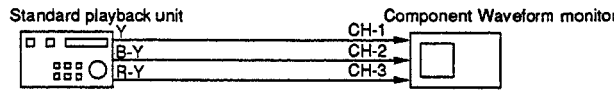
for PAL

Equipment: Component Signal Generator, Oscilloscope or Component Waveform monitor

Preparation:
- Input signal: 60 % MULTI BURST
- Insert a blank tape (BCT-20MA) into the unit.
- Alignment tape (CR5-1B PS)

Connection: CONNECTION 2

Component Waveform monitor connection



Test point: R-Y,B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure
1. Put the unit into REC mode for about 30 seconds.
2. Playback the recorded portion with a standard playback unit. Measure the levels at the following frequencies. The reference level is at 8T BAR portion of 60 % MULTI BURST.
3. When the specification is not satisfied, perform 9-5-18. C Recording Current Frequency Response Adjustment within the specification again.

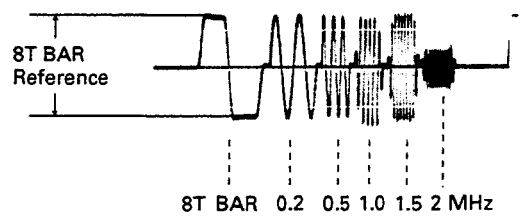
Overall C Recording Frequency Response Check		C Recording Current Frequency Response Adjustment
measure low	⟶	more lower
measure high	⟶	more higher

Specification:

Specification/ CH-A and CH-B

Frequency (MHz)	Alignment tape (dB)	(%)
8T BAR	0 dB (Reference)	100% (Reference)
0.2	± 0.8 dB	$^{+9.6}_{-8.8}$ %
0.5	± 0.8 dB	$^{+9.6}_{-8.8}$ %
1.0	± 1.0 dB	$^{+12.2}_{-10.9}$ %
1.5	+ 1.0 dB − 1.5 dB	$^{+12.2}_{-15.9}$ %

- Measure the levels at the center of moire.



9-5-25. Recording Y/C Delay Adjustment

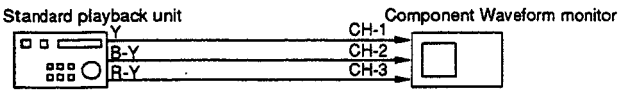
Use a standard playback unit which the Play Back Y/C Delay and Play Back C/C Delay are adjusted by the alignment tape (CR5-1B or CR5-1B PS).

Equipment: Component Signal Generator, Oscilloscope, Component Waveform monitor

Preparation:
- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.

Connection: CONNECTION 2

Component Waveform monitor connection



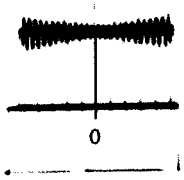
Test point: Y, R-Y, B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

Adjustment procedure

1. Insert a blank tape(BCT-20MA) into the unit, and put the unit into REC mode for about 30 seconds.
2. Playback the recorded portion with a standard playback unit, and measure the Y/C delay.
3. Specification: Y/C delay = 0 ± 28 ns

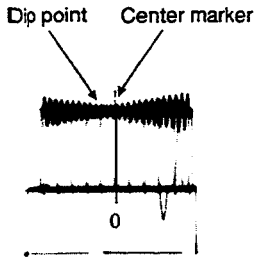
Component waveform monitor

BOWTIE mode --- (CH-1,CH-2)

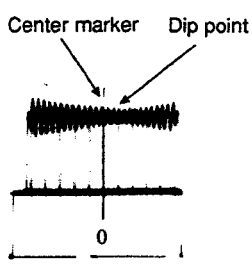


Y/C delay = Difference of center marker and dip point
(1 graduation = 20 ns)

C advances



C delays

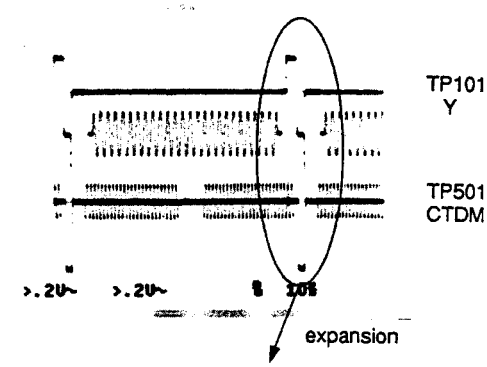


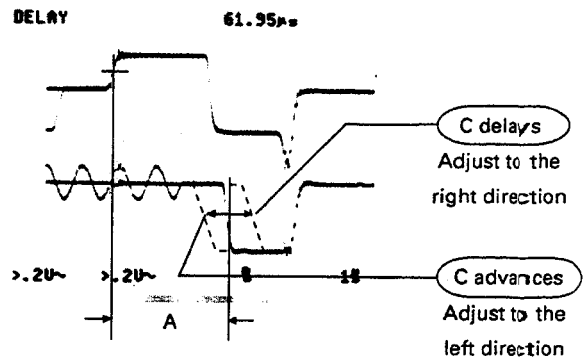
When the specification is not satisfied
Adjust ◐ RV450 (C REF SYNC position) in REC mode.
After the adjustment, check adjustment procedure 1 to 3 again.

Preparation:
- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.

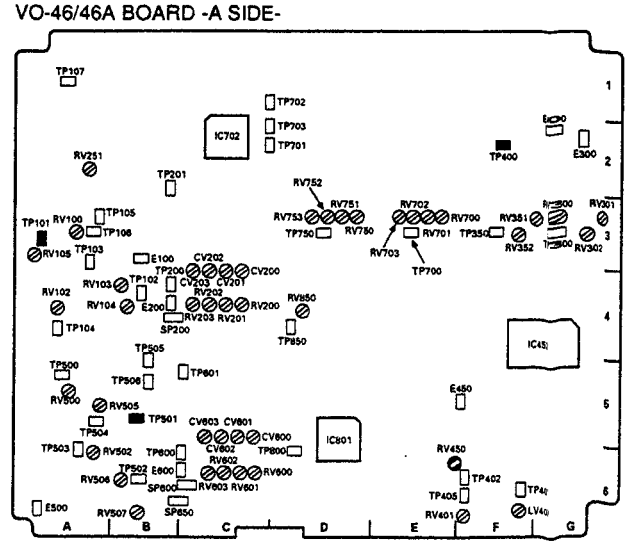
Connection: CONNECTION 2
Test point: CH-1:TP101/VO-46 (46A) Board (Y)
CH-2:TP501/VO-46 (46A) Board (CTDM)
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ◐ RV450/VO-46 (46A) Board
Specification: A = 3.2 ± 0.1 µs

Oscilloscope





VO-46/46A BOARD -A SIDE-



9-5-26. Recording C/C Delay Adjustment

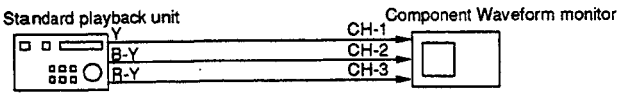
Use a standard playback unit which the Play Back Y/C Delay and Play Back C/C Delay are adjusted by the alignment tape (CR5-1B or CR5-1B PS).

Equipment: Component Siganl Generator, Oscilloscope, Component Waveform monitor

Preparation:
- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.

Connection: CONNECTION 2

Component Waveform monitor connection



Test point: Y, R-Y, B-Y OUT / Standard playback unit
Trigger: REF VIDEO OUT / Standard playback unit

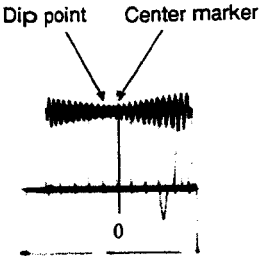
Adjustment procedure
1. Insert a blank tape (BCT-20MA) into the unit, and put the unit into REC mode for about 30 seconds.
2. Playback the recorded portion with a standard playback unit, and measure the C/C delay.
3. Specification: C/C delay = 0 ± 28 ns

Component Waveform monitor

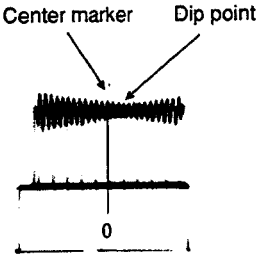
BOWTIE mode --- (CH-1,CH-3)

C/C delay = Difference of center marker and dip point (1 graduation = 20 ns)

R-Y advances



R-Y delays

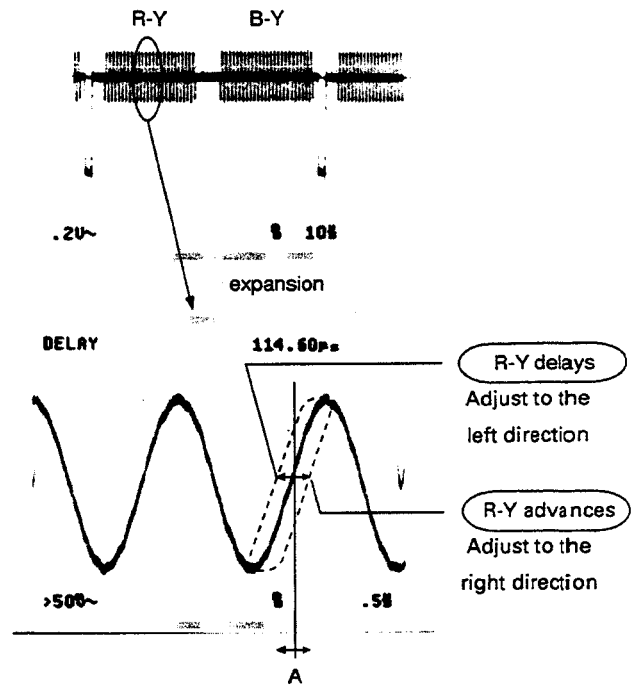


When the specification is not satisfied
Adjust ◐ RV300 (C/C delay) in REC mode.
After the adjustment, check adjustment procedure 1 to 3 again.

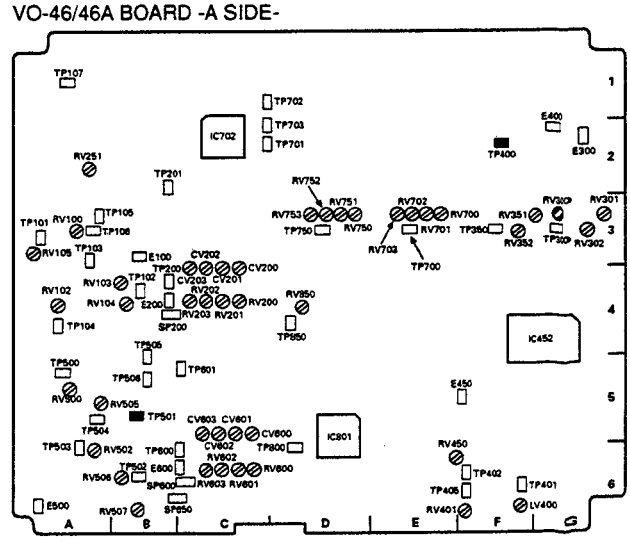
Preparation:
- Input signal: BOWTIE
- Insert a blank tape (BCT-20MA) into the unit.
- REC mode

Connection : CONNECTION 2
Test point: TP501/VO-46 (46A) Board
Trigger: TP400/VO-46 (46A) Board
Adjusting point: ◐ RV300/VO-46 (46A) Board
Specification: A = 0 ± 5 ns

Oscilloscope



VO-46/46A BOARD -A SIDE-



9-6. ELECTRICAL ALIGNMENT WITH REPLACEMENT OF MECHANICAL PARTS

9-6-1. Electrical Alignment After Upper Drum Assy or Drum Assy Replacement

- 9-5-8. Y Recording Current Frequency Response Adjustment
- 9-5-9. Y Recording Current Level Adjustment
- 9-5-18. C Recording Current Frequency Response Adjustment
- 9-5-19. C Recording Current Level Adjustment
- 9-5-20. Y RF Level Adjustment
- 9-5-21. C RF Level Adjustment
- 9-5-22. RF Alarm Adjustment
- 9-5-23. Overall Y Recording Frequency Response Check
- 9-5-24. Overall C Recording Frequency Response Check
- 9-5-25. Recording Y/C Delay Adjustment
- 9-5-26. Recording C/C Delay Adjustment

9-6-2. Electrical Alignment After Audio Head Replacement

- 9-4-1. Audio Level Volume Reference Position Adjustment
- 9-4-4. Playback Frequency Response Adjustment
- 9-4-5. Playback Reference Level Adjustment
- 9-4-6. Bias Trap Adjustment
- 9-4-7. Bias Current Adjustment
- 9-4-8. Overall Recording Level Adjustment
- 9-4-9. Overall Dolby Frequency Response Adjustment
- 9-4-10. Overall Channel Phase Adjustment

9-6-3. Electrical Alignment After Capstan Replacement

- 9-3-1. Capstan Free Speed Adjustment
- 9-3-2. Stop Servo Adjustment

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